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ABSTRACT

This hearing on legislation designed to encourage contributions of computers and computer equipment to elementary and secondary schools emphasizes California's experience with a state-level program. Testimony is included from the following witnesses: Kay Pacheco, Alameda County Office of Education; Michael D. Rashkin, Apple Computer, Inc.; Barbara Bowen, Apple Education Foundation; David Bossen, Measurex Corp. on behalf of the American Electronics Association; Edmund G. Brown, Jr., National Commission on Industrial Innovation; Fern Burch, on behalf of Glenn T. Seaborg, Lawrence Hall of Science, University of California, Berkeley; Michael D. Schuetz, California Federation of Teachers, Committee on Computer Technology and Education; Del A. Weber, California Teachers Association; Bobby Goodson and LeRoy Finkel, Computer-Using Educators, Inc.; Alwine Fenton and Young Kim, Eden Gardens Elementary School, Hayward, California; Louis J. Goins, Baden High School, South San Francisco; Gary Gubitz, Hewlett-Packard Co.; Thomas Heineman. Livermore Valley Joint Unified School District; Lillian Heller, Kaypro Corp.; Emery Rogers Hewlett-Packard Foundation, National Grants Review Board; Joan Targ, Interactive Sciences, Inc.; and Chris Thacker, Jordan Middle School, Palo Alto, California. Statements are included from Donald Devine, Association of Data Processing Services Organizations; Sala Burton, California Congressional Representative; and Tandy Corporation/Radio Shack. (LMM)

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COMPUTER CONTRIBUTION ACT OF 1983

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HEARING

BEFORE THE

SUBCOMMITTEE ON
SELECT REVENUE MEASURES

OF THE

COMMITTEE ON WAYS AND MEANS
HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

FIRST SESSION

ON

H.R. 701

NOVEMBER 11, 1983
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COMPUTER CONTRIBUTION ACT OF 1983

FRIDAY, NOVEMBER 11, 1983

House of Representatives,
Committee on Ways and Means,
Subcommittee on Select Revenue Measures,
San Francisco, Calif.

The subcommittee met at 10 a.m., pursuant to notice, in room 282, City Hall, San Francisco, Calif., Hon. Fortney H. (Pete) Stark (chairman of the subcommittee) presiding.

[The press release announcing the hearing, and a copy of the bill, H.R. 701, follow:]

[Press Release of Friday, Oct. 21, 1983]

Hon. Fortney H. (Pete) Stark, Chairman, Subcommittee on Select Revenue Measures, Committee on Ways and Means, U.S. House of Representatives, Announces a Field Hearing on H.R. 701, "The Computer Contribution Act of 1983" To Be Held in San Francisco, Calif.

The Honorable Fortney H. (Pete) Stark (D., Calif.), Chairman, Subcommittee on Select Revenue Measures, Committee on Ways and Means, U.S. House of Representatives, announces a public hearing on H.R. 701, "The Computer Contribution Act of 1983." This legislation would amend the Internal Revenue Code of 1954 to encourage contributions of computers and other computer equipment to elementary and secondary schools. The hearing will be held on Friday, November 11, 1983, at 10:00 a.m. in the City Hall, McAllister & Grove, Room 282, San Francisco, California 94102 (use Polk Street entrance). Testimony will be taken from invited witnesses only. Other interested parties may submit testimony for the record.

BACKGROUND

California has been a leader in encouraging donations of computers to elementary and secondary schools for educational purposes. California enacted legislation modeled after the proposed Federal law, H.R. 701, which has resulted in dramatic increases in the number of computers donated to schools in that State. The purpose of the field hearing is to determine whether tax concessions encourage substantially increased donations of equipment and whether these donations serve a useful educational purpose in the recipient schools. In addition, the Committee is interested in determining whether these donations have been equitably distributed between schools in different geographic areas and among economically divergent school districts. The Committee hopes to determine whether the California experience might serve as a useful model for a national program.

SUMMARY OF PROPOSED LEGISLATION

Under present law, the amount of a charitable deduction otherwise allowable for donated property generally must be reduced by the amount of any ordinary income which the donor would have realized had the property been sold for its fair market value at the date of the contribution (Code sec. 170(e)). A donor of appreciated ordinary-income property (property the sale of which would not give rise to long-term capital gain) generally may deduct only the donor's basis in the property, rather than the fair market value.

A different rule applies to charitable contributions by corporations of two types of ordinary-income property if donated to certain exempt organizations for specified purposes. The special rule applies to corporate donations of ordinary-income property to a charitable organization to be used solely for care of the needy, the ill, or infants (such as medical equipment), where such use is related to the donee's charitable functions (sec. 170(e)(3)). Also, the special rule applies to corporate donations of newly manufactured scientific equipment to a college or university to be used for research (or research training) in the United States in the physical or biological sciences (sec. 170(e)(4)). In these cases, the corporate donor is allowed a deduction equal to the sum of its basis in the property plus one-half of the unrealized appreciation (i.e., the difference between fair market value and basis), but not in excess of twice the basis.

The legislation proposed by Chairman Stark, H.R. 701, provides a special deduction rule for charitable contributions made by corporations of certain newly manufactured computers to primary or secondary schools for the use at the school directly in the education of students.

DETAILS FOR INVITED WITNESSES

Individuals and organizations invited to testify should contact Harriett Lawler ((202) 225-3627) of their acceptance, no later than noon, Friday, November 4, 1983. Witnesses will be supplied with additional scheduling information by telephone as soon as possible after the November 4 deadline.

Time for oral presentations will be limited with the understanding that a more detailed statement may be included in the printed record of the hearing. This procedure will afford more time for members to question witnesses. In order to expedite the hearing, witnesses may be grouped as panelists with time limitations for each panelist.

In order to assure the most productive use of the limited amount of time available to question witnesses, witnesses scheduled to appear before the Subcommittee must comply with the following rules:

1. All witnesses must submit 50 copies of their prepared statement at the time of the hearing.
2. Witnesses should not read their written statements to the Subcommittee, but should instead limit their oral presentations to a summary of the points included in the statement.
3. Not more than five minutes will be allowed for the oral summary.

WRITTEN STATEMENTS IN LIEU OF PERSONAL APPEARANCE

For those who wish to file a written statement for the printed record of the hearing, five copies are required and may be submitted to John J. Salmon, Chief Counsel, Committee on Ways and Means, U.S. House of Representatives, Room 1102, Longworth House Office Building, Washington, D.C. 20515, by close of business, November 28, 1983.

I

98th CONGRESS
1st Session

H. R. 701

Entitled: "Computer Contribution Act of 1983".

IN THE HOUSE OF REPRESENTATIVES

January 6, 1983

Mr. Stark (for himself, Mr. Gore, and Mr. Shannon) introduced the following bill; which was referred to the Committee on Ways and Means

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A BILL

Entitled: "Computer Contribution Act of 1983".

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Computer Contribution Act of 1983".

SEC. 2. CHARITABLE CONTRIBUTIONS OF COMPUTER EQUIPMENT TO PRIMARY AND SECONDARY SCHOOLS.

Subsection (e) of section 170 of the Internal Revenue Code of 1954 (relating to certain contributions of ordinary income and capital gain property) is amended by adding at the end thereof the following new paragraph:

"(5) SPECIAL RULE FOR CONTRIBUTIONS OF COMPUTER EQUIPMENT TO PRIMARY AND SECONDARY SCHOOLS—

"(A) LIMIT ON REDUCTION.—In the case of a qualified contribution of computer equipment, the reduction under paragraph (1)(A) shall be no greater than the amount determined under paragraph (3)(B).

"(B) QUALIFIED CONTRIBUTION OF COMPUTER EQUIPMENT.—For purposes of this paragraph, the term 'qualified contribution of computer equipment' means a charitable contribution by a corporation of tangible personal property described in paragraph (1) of section 1221, but only if—

"(i) the contribution is to a qualified educational organization,

"(ii) the contribution is made pursuant to a written plan of the taxpayer which shall seek to prevent undue concentrations of the taxpayer's contributions of computer equipment from the geographic standpoint or from the standpoint of the relative economic status of the donees' students, "(iii) the property is assembled by the taxpayer and the taxpayer is regularly engaged in the business of assembling and selling computer equipment of the same kind as such property,

"(iv) the contribution is made—

"(I) not later than 6 months after the date the assembly of the property is substantially completed, and

"(II) during 1984,

"(v) the original use of the property is by the donee.

"(vi) the property is computer equipment substantially all the use of which by the donee will be at the institution directly in the education of students,

"(vii) the property is not transferred by the donee in exchange for money, other property, or services, and

"(viii) the taxpayer receives from the donee a written statement representing that its use and disposition of the property will be in accordance with the provisions of clauses (vi) and (vii).

"(C) QUALIFIED EDUCATIONAL ORGANIZATIONS.—For purposes of this paragraph, the term 'qualified educational organization' means—

"(i) an educational organization which is described in subsection (b)(1)(A)(ii), and

"(ii) a school operated as an activity of an organization described in section 501(c)(3) and exempt from income tax under section 501(a) if such school normally maintains a regular faculty and curriculum and normally has a regularly enrolled body of pupils or students in attendance at the place where its educational activities are regularly carried on.

Such term shall not include any institution of higher education (as defined in section 3304(f)) and shall not include any organization not located in the United States.

"(D) COMPUTER EQUIPMENT.—For purposes of this paragraph, the term 'computer equipment' means—

"(i) a data processor which—

"(I) can be programed in at least 3 standard computer languages, "(II) has a random access memory with a capacity for at least 32,000 bytes, and

"(III) is (or can be) connected with a screen for visual display of the data,

"(ii) if donated by the taxpayer for use in connection with a data processor described in clause (i) donated by the taxpayer—

"(I) a display screen,

"(II) a printer, or

"(III) a disc drive, and

"(iii) any installation equipment for equipment described in clause (i) or (ii).

"(E) CORPORATION.—For purposes of this paragraph, the term 'corporation' shall not include—

"(i) an electing small business corporation (as defined in section 1371(b)),

"(ii) a personal holding company (as defined in section 542), and

"(iii) a service organization (as defined in section 414(m)(3)).

"(F) Gifts made under this Act shall be considered charitable contributions.".

SEC. 3. EFFECTIVE DATE.

The amendment made by section 2 shall apply to taxable years ending after December 31, 1983.

○

Chairman **Stark**. The Subcommittee on Select Revenue Measures of the Committee on Ways and Means of the U.S. House of Representatives will commence a hearing on H.R. 701, the Computer Contribution Act of 1983. This is legislation which myself and many other Members of the House introduced in January of this year to encourage the donation of computers to primary and secondary schools by providing an enhanced charitable contribution to the donor.

Identical legislation passed the House by a vote of 223 to 61 last year, but failed to reach the Senate floor and it parallels legislation added by the Congress in 1981 for the donation of scientific equipment to colleges and universities for research purposes.

This legislation, I want to emphasize, is not designed to benefit any one company or industry, but it was designed to help the children and the schools by providing them with up-to-date equipment which many schools simply can't afford to purchase themselves.

It is our feeling that computer technology and the use of computers has become a growing force, if not a major force in our lives, and our school-age children ought to be able to benefit from the learning potential of the computer phenomena.

We would like to find out more about the educational potential of the computer. Quite frankly, we would like to find out whether the taxpayers are getting enough bang for their buck. It is conceivable the schools could go out and shop for computers at the discount stores and acquire them for less than they can through encouraging the donation through the tax system. We will find out, we hope, as we gather more information.

Last year, California's Legislature, leading the way as they often do, adopted legislation modeled upon my bill, and California now has the most advanced computer donation program in the country. We have come to California to look at how this legislation has been implemented here and see if the computers were provided on an equitable basis, in a timely manner, whether these machines have served a useful education purpose.

I hope today's hearings will help us answer these questions. We will be as informal as we can, without confusing the recorder, so that we build a record that will be useful for us legislatively later. We will ask witnesses to join us here at the witness table so you can all hear them better.

We are honored to have a person who has been in the forefront of the new wave of technology, a person who has, I think, encouraged an awful lot of people to think about their lives and about Government and what education means to us. It is a great pleasure for the Chair to introduce to the hearing, Hon. Jerry Brown, now chairman of the board of the National Commission on Industrial Innovation, but we all knew him as secretary of state and for many years as the Governor of our great State.

It is a great pleasure to welcome you here, Jerry. You have a prepared statement which will appear in its entirety in the record. You may summarize it or add to it in any way you wish.

Welcome to the committee.

STATEMENT OF EDMUND G. BROWN, JR., CHAIRMAN OF THE BOARD, NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

Mr. BROWN. Thank you very much, Congressman.

It is a pleasure to be able to discuss the success in California of the computer donation program. It is very timely because at a time when so many people are concerned about education, about the general level of excellence and productivity in the Nation, new technologies such as the personal computer offer a major opportunity to achieve goals of enhanced learning and better output and better performance.

The first premise of the computers in schools program, the donation of computers to high schools and grammar schools, is that the computer provides a very unique learning opportunity, namely individualized, interactive learning possibilities. This benefits the slow learner, the average learner, the above-average learner. It benefits the whole society.

The use of computers in schools is still in its infancy. The amount of courseware is very limited and it will take some time before the full potential of the technology is realized. Even though we are some years from the full implementation of computers in schools, we now know from studies, from the experience that has already been developed, that the computer really is a significant aid. It provides in combination with appropriate instruction and good teachers and financial support a major revolutionary development in the organization of American schools.

I want to focus now precisely on what was done in California. Last year, a tax credit of 25 percent of the fair-market value was made available to any manufacturer that donated computers to high schools, public or private, in the State of California.

As a result, over 10,000 computers have now been donated, principally from Apple Computer Co., but also Atari, Commodore Business Machines, Hewlett-Packard, IBM, Kaypro and others have developed interesting and often very unique programs to bring the computers into the schools.

The tax credit operates very simply. It is not bureaucratic; it makes distribution the burden of the donor; and it starts very quickly and really provides a very attractive alternative, given some of the paralysis that we occasionally find in government. We know the need is there. We know that a tax credit will result in a significant number of computers being put into the schools, and for that reason, I recommend a Federal tax credit wholeheartedly. It is not a panacea, it is not going to end a lot of other problems that we have to confront in school, but it is a positive step forward.

If the tax credit is combined with two other features, first, the support for teacher training, and second, the support for appropriate clearinghouses for the evaluation of courseware, then I believe the tax credit will make a very definite positive contribution to the welfare of this country.

In California, the legislature enacted, and I signed into law, a measure that set up 15 TECC centers, teacher education computer centers, where teachers could be instructed on the use of computers in schools and literally tens of thousands of teachers have already taken advantage of this program after school and on the weekends throughout this State.

I have here a map of California that shows how the State was divided into 15 regions. In each of those regions, there is a small number of personnel that is available to instruct teachers and give them the kind of training they need to really make use of the hardware.

You will find some that will say, "Wait"; you will find people that say, "Well, the hardware is too complicated and we have to have more studies," but I don't believe that. I believe that the young people of America know how to use computers. If they don't, they learn very quickly, and if the hardware is provided, then good things will follow.

I believe teachers are well motivated. They will learn to do their part and a tax credit for a limited period of time cannot be anything but a very positive development. Then you add the other features of support for teacher training and support for the proper evaluation of courseware and you have a three-point program that will serve the public interest.

This will benefit companies because people who use the computers may wish to buy them for their own homes. What I see here is the partnership: Business, government, and schools, all combining to create a good, solid result. The teachers' organizations also should play a major role in this and I think they can, as evidenced by their presence here.

So all in all, I believe that the Congressman has a very excellent bill and relative to what is spent in education and relative to what is spent on other items in the national government, this is a very small amount of dollars that really should be viewed as planting some seeds that we all can harvest for many, many years to come.

We face a challenge in the schools. We are never going to have the full teacher resources that we need and computers are a very important supplement to make sure that each child can access the full amount of learning opportunity that he or she really needs and has the potential to benefit from. That is really what the computer provides.

Then, when video disks are made available, when communications systems are set up, I believe the schools of America can be revolutionized in this decade and this tax credit bill can be one step in that much larger challenge which is bringing American education up to the international challenge that the United States faces.

Thank you very much.

[The prepared statement follows:]

STATEMENT OF EDMUND G. BROWN, JR., CHAIRMAN OF THE BOARD, NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

At a time of public concern about education and about the general decline of excellence and productivity in the nation, new technologies such as the personal computer offer a major opportunity to achieve goals of enhanced learning, better output and better performance. The computer provides individualized, interactive learning possibilities to benefit slow learners, average learners and above average learners. In combination with appropriate instruction, good teachers and financial support, computers offer a major revolutionary development in the organization of American schools.

The California experience provides a model for national policy related to the integration of computers into our educational systems. The initiation of a computer education program requires computer equipment, teacher training and educational software. The effective use of computers in schools requires an investment in research on education and technology.

Eight specific policy recommendations are presented below: tax incentives for donations of computers to schools, direct grants to schools for purchasing computers, regional teacher training centers, school of education teacher preparation, national information clearinghouse on educational software, standards for use of educational software, research on educational technology, research on electronic networks.

COMPUTER EQUIPMENT

It is essential that computers are available and accessible to all of our nation's children. The California experience suggests two complementary directions to accomplish this objective: tax incentives for corporate donations and direct grants to schools.

Recommendation 1: Tax Incentives.—Stimulation of industry donations through tax incentives at both the state and federal level are needed to increase the number of computers in schools, and to bring donating corporations and recipient schools into new mutually beneficial working relationships. On the basis of the success of our California Computers in Schools tax credit, the Congress should enact a similar federal tax credit for a three-year period.

Last September landmark legislation provided a California state tax incentive for donations of computers to schools. The Computers in Schools tax credit [A.B. 3194, Imbrecht] took effect in January of this year and will sunset June 30, 1984. The law allows a tax credit equal to 25 percent of the fair market value of any computer, equipment or apparatus donated to a California public or private school for instructional purposes.

As a result of the first ten months of the California Computers in Schools tax credit there are today more than 11,000 donated computers distributed throughout the schools of California—representing at least a half dozen manufacturers. By June of 1984 when the eighteen month tax credit terminates, we expect that the total number of computers in California schools will have more than doubled. We estimate that, on the average, the public cost of the 25 percent tax credit for each donated computer will be less than one half the cost of each computer purchased. [This estimate is based on two assumptions: -1-the cost of the tax credit is only 25 percent of fair market value while direct purchases by schools would be at bulk rates of approximately 50 percent of retail costs, and -2-donation program design and implementation costs are borne by industry without costly expansion of government bureaucracy.]

Here are examples of six corporate donation programs:

Apple Computer initiated its "Kids Can't Wait" project with donations of approximately 9,000 Apple IIe systems, one to almost every public and private school in California. The computers were distributed to the schools by Apple dealers throughout the state. The dealers provided an orientation session in conjunction with each donation. In addition, the Apple Education Foundation aids in teacher-training and basic research.

Atari has made donations of 39 computer systems plus software and cash for purchasing peripheral equipment to schools in California since January 1983 [value: $144,000]. These donations augment prior donations made by the Atari Institute for Educational Action Research to schools participating in their projects. These include the "Sisters Schools Project", the "Home-School Networking Project" and the "Animation Project" at Rowland High School in Los Angeles.

Commodore Business Machines has donated 320 computers to fifteen educational institutions in California. Each received 12 Commodore monitors, 12 commodore 64 computers, 12 datasettes, 4 disk drives and 2 printers. In addition, Commodore is establishing five educational dealers in California, is providing a maintenance training program for school districts with Commodore equipment and is offering a free Commodore modem [for the 64 or VIC-20] and a CompuServe subscription to any school district or educational agency that signs up to be a Commodore "Education Resource Center".

Hewlett-Packard launched its "Grants for Instruction in Future Technologies", GIFT, initiative which placed full personal computer systems, teacher-training sessions and technical liaison support in 14 selected California high schools [value: approximately $700,000]. Hewlett-Packard chose model schools with high enrollments of MESA students. These are female and minority students receiving scholarships and academic counseling from the Math Engineering Science Achievement program conducted by the Lawrence Hall of Science at the University of California at Berkeley. The company is conducting a careful evaluation of the GIFT program in order to improve its educational products and programs.

IBM employed the Educational Testing Service to design their "Model Secondary School Project". They are donating computers to schools in Florida and New York as well as California. This Fall, 28 public and private high schools in California received donations of 15 IBM PC's and $5,000 worth of software. Before the computers were sent to the schools, the teachers were required to attend extensive training programs. These were conducted at local teacher training institutions by local experts who had received special training on the educational applications of the IBM PC. The Educational Testing Service will evaluate and report on the outcomes of the IBM project.

Kaypro computers began its "Kaypros for Kids" program with donations of over 400 computers to middle, junior and senior high schools in San Diego County [value: approximately $700,000]. Each computer is accompanied by a complete software package. School sites were selected from proposals submitted by teachers interested in incorporating computers into their curricula. Kaypro provides teachers with orientation and inservice training. Additional Kapros have been loaned to the San Diego chapter of Computer Using Educators and are being used for an electronic network to support participating teachers. "Kaypros for Kids" has announced Kern County as its next site for school donations.

In addition to the donations already in place, there are several other computer manufacturers who are either developing new donations programs or are planning to expand existing programs. Companies are also providing support for the use of computers in schools.

Radio Shack is offering free teacher-training classes to every school in the United States. The training is called "America's Educational Challenge" and would normally be valued at about $200 per teacher.

Compuserve Information Services is providing accounts at reduced subscription fees to California educators. This will enable California educators to have access to nationwide data banks and electronic mail services, as well as the opportunity to communicate with each other electronically.

Kaypro and Texas Instruments have donated equipment to support the management of the electronic network.

The first ten months of the California tax credit, have resulted in a diversity of individual companies donation programs. Tax incentives to encourage donations should not restrict this diversity. Each potential corporate donor is unique in corporate philosophy, in the special capabilities of its equipment and in its long-term marketing goals. While a company with a broad range of educational applications might prefer to distribute only one or two computers to many schools, another company whose equipment has one or two specialized applications may prefer to donate several computers to one or two schools, or to a particular grade level, or student population. Tax incentives to encourage donations should not restrict this diversity.

Tax incentives must also respect individual companies' level of desire for involvement with the use of its equipment in recipient schools. While federal and state legislation should include tax incentives for teacher training and maintenance contracts as well as hardware donations, legislation should not impose these as requirements. Companies are willing to take innovative approaches to monitor and learn from their donations experiences. New legislation must not restrict long-range corporate planning by over-regulation.

Recommendation 2: Grants to Schools.—Tax incentives for corporate donations of computers to schools will not do the entire job of making computers available and accessible to all children. A federal program of grants to schools is needed for the purchase of computer systems. A direct grants program is especially important for schools in low income and minority communities. They need assistance to purchase computers so that their students do not fall behind students from schools in affluent communities where parents have purchased computers with the proceeds of bake sales, spaghetti feeds and other fund-raising activities. The High-Tech Morril Act would provide a suitable mechanism for implementation of this recommendation.

Funding for grants should be directed both through specific computer education legislation and as part of the federal block grants program.

In some California school districts, block grants have been an important source of funding for purchasing computers. For example, in San Diego there has been a 200 percent increase in the number of computers in schools, and in Orange the number of computers has increased from 7 to 240 over the last three year period. In other districts none of the block grant funds have been used for computer purchases.

States should be given maximum flexibility in administering the program. To discourage unnecessary expansion of state bureaucracies, incentives should encourage states to combine the administration of the federal program with existing state programs. Similarly, states should be required to allow maximum flexibility to administration at the local school districts.

Grant applications should include school-level plans for integrating and supporting the use of computers in the instructional program.

Grant funding should include hardware, software, peripherals, security systems and maintenance services.

Priority should be given to schools with the greatest need and least capability of otherwise purchasing computers.

Priority should be given to programs that will demonstrate new approaches toward making computers available to low income children and their families and toward ensuring that home computers and educational courseware are complementary to the school curriculum.

Priority should be given to schools which are able to combine government funding with matching grants from private industry.

TEACHER TRAINING

Of first importance to the effective integration of computers into the schools is the training of teachers in the educational uses of computers. Put simply, teachers can not possibly introduce the new technology to their students without sufficient understanding of it themselves. State and national legislation should stimulate new approaches to teacher training on the integration of computers into classrooms. New approaches to teacher training are needed both in the schools of education which are preparing new teachers and in inservice training programs for teachers already working in the schools of our nation.

Recommendation 3: Inservice Training—A number of recent reports have indicated that there is an immediate need to update the educational technology skills of classroom teachers. The California TEC Centers provide a model for other states to create similar programs for teachers throughout the nation.

The Investment in People program was initiated in the 1982-1983 California Governor's Budget. Investment in People was a series of programs designed to meet the challenge of the Information Age. To prepare the people of California for the new economy the Investment in People program established education and training programs for displaced workers, for welfare clients, for the state colleges and universities—including a computer aided productivity laboratory at California State University at San Luis Obispo—and teacher training funds for K-12 education.

Since the use of computers in schools had already begun outside of the educational bureaucracy, planning for the K-12 component relied on the experience and expertise of grassroots teacher groups throughout the state, including Computer Using Educators [CUE]. The integration of micro computers into California's schools had progressed to the point of now requiring a substantial effort for training teachers and for training teacher trainers. The Investment in People Program established a statewide network of Teacher Education/Computer Centers, governed by fifteen regional policy boards. Each TECC region received base funding of $125,000 to purchase computer hardware and software for demonstration laboratories, plus additional funding to hire computer education specialists to broker or provide teacher training. The total new cost for the first year of the California TECC network was $4.1 million, or one dollar for each elementary and secondary student in the state's public schools. The second year budget for the TEC Centers is $5.9 million.

Also, $100,000 funded a one year series of Computer Institutes to train a statewide cadre of specialists in educational computing and teacher training. During their first year, the new TEC Centers served an escalating teacher demand for computer training, as dramatically demonstrated in Los Angeles where TECC workshops on computer education drew waiting lists of 2,000.

The regional TECC policy boards set up teacher training and computer demonstration laboratories in a total of 157 separate facilities. These included training sites in schools, in county offices and transportable computer laboratories in mobile vans.

Mandated to broker training as well as to provide direct training of teachers the TEC Centers have worked with school districts, industry, higher education and military. For example, staff of the Jet Propulsion Laboratory trained teachers in the Pasadena School District, and staff from the Naval Oceans Services Center taught teachers in San Diego.

To date, four key components have been central to the success of the California TEC Center program:

Involvement of grassroots teacher organizations in program planning;

Computer Institutes for the training of teacher trainers;

Decentralized administration for specific geographic regions; and

Focus on the brokering of training as well as direct training.

Recommendation 4: Teacher Preparation.—We need to address the emerging problem of the readiness of our nation's schools of education to prepare the teachers who will soon be needed in our schools. Our schools of education need to attract students who are excited about learning to use the new computer technologies in teaching. Our schools of education need to employ computer literate educators on their faculties.

Schools of education, in cooperation with government and private industry, should create endowed chairs for educational technology at selected teacher-training colleges and universities throughout the nation. These chairs should be staffed by people who have had classroom experience in teaching with computers, who are willing to engage the expertise of faculty from other academic departments and who are able to work with industry to keep abreast of the latest technological innovations.

In California, we are entering a period of special opportunity to assimilate new teachers into our schools. In many California school districts declining enrollments have resulted in lay-offs of the newest teachers. As a result, the average age of teachers in California has advanced to 46 years, statewide, and to 56 years in certain districts. This will result in an exodus of 150,000 retiring teachers during the next ten years.

EDUCATIONAL SOFTWARE

Over the last two years there has been a rapid increase in the quantity and quality of educational software. Teachers are confronted with the problem of finding and evaluating software for classroom use. This requires that teachers have means to locate and evaluate software.

Recommendation 5: National Information Clearinghouse on Education Software. Federal legislation is needed to establish a national clearinghouse modelled after California's Software Library and Clearinghouse. The National Software Clearinghouse should coordinate the efforts of individual states by networking and disseminating information between states. A centralized program at the national level should assest state programs to avoid redundancy and duplication of effort.

Last year California established a software library and clearinghouse as part of the Investment in People program. This central clearinghouse collects and evaluates commercially developed educational software. The evaluations are disseminated statewide.

Recommendation 6: Standards.—Support must be given to existing efforts to develop standards related to the purchase and use of educational courseware. Neither the federal nor state governments should become involved in regulating the content of educational courseware. Encouragement, not restraint, is needed to stimulate the development of innovative educational courseware.

The widespread problem of software piracy is a disincentive to private companies engaged in software development. The copyright policy recently adopted by the International Council of Computers in Education [ICCE] can well serve as a national model for guiding the purchase and use of multiple copies of educational software.

The fact that software is not transportable from one brand of microcomputer to another has resulted in unnecessary costs to schools and software producers. Programs written to run on one brand of equipment must be rewritten to run on another manufacturer's model. Market forces will solve this problem without government intervention.

Federal and state legislators must prevent premature government regulation and cumbersome bureaucratic procedure from interfering with the development and accessibility of innovative educational software.

RESEARCH ON EDUCATION AND TECHNOLOGY

As private industry invests large sums of money in the research and development of new electronic technologies, educators are falling further and further behind in developing educational applications. This gap must be closed. Educational research is needed to increase our understanding of the most effective methods for integrating and coordinating new electronic technologies into our educational systems. Research is needed on the coordination of computers, video disks, and telecommunications into comprehensive educational programs. In order to avoid the unnecessary cost and redundancy of individual state research programs it would be best that Congress provide federal support for research on education and technology. In addition, state and federal governments' fiscal policies should encourage private industry investment in long-range educational research.

Recommendation 7: Research on Educational Technology.—The effective integration of new educational technologies into the schools requires basic research on computer assisted learning and instructional methods. In order for computers to realize their educational potentials new knowledge is needed on their applications to facilitate problem-solving skills, higher order thinking skills. A comprehensive national program is needed to initiate educational research in universities, industry, public and private research centers.

Recommendation 8: Research on Electronic Networks.—Rapid developments in the area of telecommunications have made possible new means of communication and information transmission. New systems for electronic networking have potential for transmitting information on new educational practices and products to large numbers of educators. Educational research and demonstration projects are needed for integrating new technologies and for ensuring that prohibitive regulations are not imposed on the educational use of new technologies.

SUMMARY

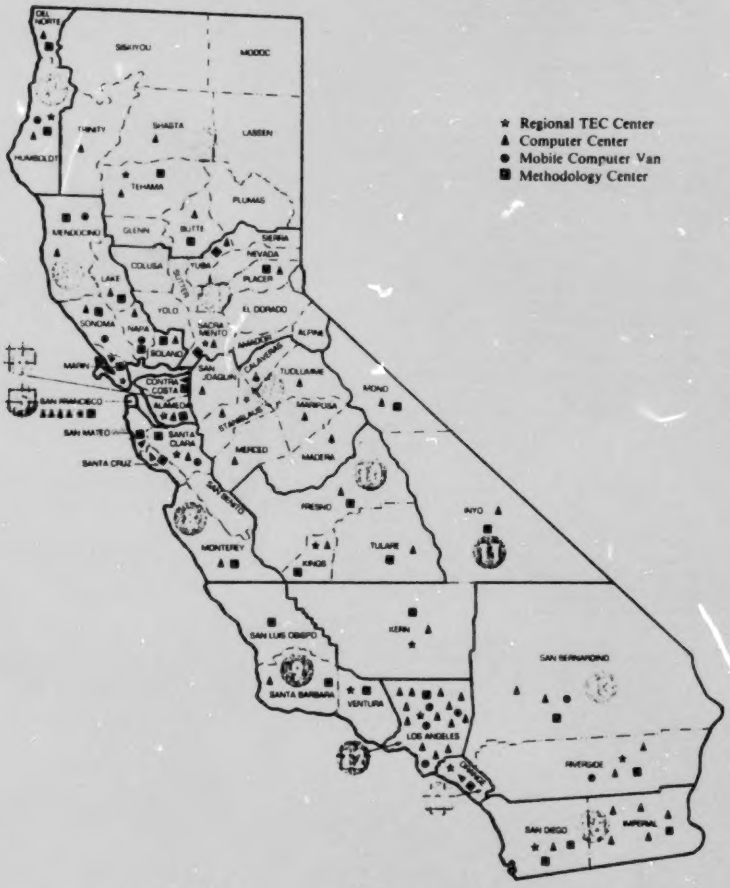
The California experience provides a model three point program for national policy related to the integration of computers into our educational systems: hardware, software and teacher training. Tax incentives for hardware donations should be supplemented with direct grants to insure equity in access to computers for all children. Teacher training programs should be developed and strengthened both at the inservice and preservice level. An information clearinghouse on educational software should supplement and coordinate software clearinghouses at the state level. Both state and federal governments should avoid interference with the market forces which encourage and refine the development of innovative software.

We have a challenge in the schools. We may never again have the full teacher resources that we need; and new educational technologies, such as computers, video disks and telecommunications, are a very important supplement. It is in the national interest to make sure that each child has a full and equal opportunity to learn and that our educational systems are equipped to meet the international challenges that face America now and in the years to come.

INVESTMENT IN PEOPLE

A California Agenda for Education and Training in the 80's

[redacted]


★ Regional TEC Center
▲ Computer Center
● Mobile Computer Van
■ Methodology Center
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
NEVADA
COLUSA
YUBA
SUTTER
PLACER
LAKE
YOLO
EL DORADO
SONOMA
NAPA
SACRAMENTO
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TUOLUMNE
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ALAMEDA
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MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
MADERA
SANTA CRUZ
SAN BENITO
FRESNO
INYO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL

Introduction

We are now in the midst of a revolution that will surpass in its magnitude the industrial revolution of the 19th century. Driven by advances in microelectronics and telecommunications, our society is transforming itself and fundamentally changing the way it works and organizes itself.

In this new age of information, wealth will not derive from a mere abundance of resources but from people—from human intelligence. Accordingly, we must nurture that intelligence through education, research and training in both the private and public sectors and thereby ensure that the people of California will remain up among the best for years to come.

During 1982, Governor Edmund G. Brown Jr. initiated a series of programs designed to meet the challenge of the information age as he forged new relationships between government, industry, education, labor, colleges and universities.

California Commission on Industrial Innovation

To forge a new alliance to promote sustainable economic growth, Governor Brown created the California Commission on Industrial Innovation. Composed of a broad range of outstanding citizens and chaired by Governor Brown, the Commission formulated an economic blueprint to strengthen California for the rest of this century. The Commission's fifty specific proposals chart a clear path to renewed productivity, educational excellence and competitiveness in world trade.

Investment in People in Our Elementary and High Schools

Governor Brown called for higher standards, including requiring at least three years of math and two years of science—with a minimum of one semester of computer study—for all high school graduates and even more math and science for college bound students.

- The State Board of Education included Governor Brown's call for a "three year math, two year science" requirement, with a semester of computer studies, in its model high school curriculum issued on December 10, 1982.
- On January 26, 1982, the California State University Board of Trustees passed a resolution raising entrance requirements in English and mathematics. Subsequently, the Board authorized a study group to consider adding additional requirements.
- At their June, 1982 meeting, the University California Regents raised the entrance requirement for mathematics from two to three years. In addition, the Regents initiated a study at the Governor's urging to consider requiring additional math and science for all incoming students.

"If we think clearly and act correctly, we can make the tools to lift millions out of poverty and ignorance and we can pioneer the new technologies that emphasize quality over quantity."

FROM THE STATE OF THE STATE MESSAGE-
GOVERNOR EDMUND G. BROWN JR.
JANUARY 7, 1982

In the 1982-83 Budget, $9.7 million was provided to upgrade math, science, computer and related education in our public schools. This money has been spent to fund:

- School-site staff development in mathematics, science, computer education, and other curriculum areas for twenty-five percent of the state's secondary schools (grades 7-12).
- Retraining of 270 teachers to become eligible for an additional credential authorization in mathematics to address the immediate shortage of qualified math teachers.
- Fifteen regional *Teacher Education/Computer Centers* to provide training in teaching methodology and to broker staff development services with major focus on math, science and computer studies. The decentralized struct of these TEC Centers has resulted in a statewide network of 114 local training facilities.

- In addition, each TECC region contains one or more computer demonstration center. Also eleven mobile computer vans are in operation providing in-service training in computer-aided instruction.
- A series of statewide *Computer Institutes* to guide teachers and administrators in establishing and operating the computer demonstration centers.
- A statewide Software Library and Clearinghouse located in the San Mateo County Office of Education, to purchase, evaluate and disseminate information on eductional software.
- A *Council on Technology Education* to solicit, review and fund proposals for teacher training in math, science and computer studies.
- The *Institute for Computer Technology*, a new, high-technology magnet school for students from three school districts in California's "Silicon Valley".
- Support for exemplary projects such as the *Mathematics Engineering Science Achievement (MESA)* program geared to motivating and supporting minority and women high school students and to help these students complete their college degrees in math, engineering and science-based disciplines.

Lastly, Governor Brown signed legislation to encourage the integration of computers into schools:

- A tax credit for companies which donate computers to elementary and secondary schools for instruction.
- An "Educational Technology Committee" to provide matching grants to school districts for the bulk purchase of computer equipment.

Investment in People in the California Conservation Corps

$35 million funds the maintenance of 25 centers ving 1,700 young Californians, aged 18-23 years. Corps members learn the work ethic by engaging in arduous, often dangerous work.

Investment in People in California Worksite Education and Training Act (CWETA) Program

Since Governor Brown signed CWETA into law on September 29, 1979, $35 million has been allocated to put more than 12,000 people to work in the skilled jobs that increasingly power our economy. More than 2,500 employers have become involved. CWETA is different because it is based on the real life demands of specific businesses. Moreover, training starts only when an employer decides to participate and agrees to hire or upgrade all graduates. The program is recognized as the most innovative job effort in the nation.

Investment in People in Our Community Colleges

$2.0 million was provided to community colleges to establish employment-based high technology training. This was supplemented by an additional $2.3 million of matching funds from labor, state and federal government. Twenty-seven campuses now have "CWETA model" programs, with priority given to projects in new and emerging technologies.

Investment in People in Our Universities

$3.3 million was provided to the California State University and the University of California to support engineering and computer science education through instructional research grants, joint appointments with industry, retraining opportunities, the purchase of modern equipment, and programs for the recruitment and retention of women and underrepresented minority students. For example, "Investment in People" funds helped establish a *Computer-Aided Productivity Laboratory* at Cal State San Luis Obispo which attracted an additional $1.5 million in private donations.

In addition to these funds, the University of California has received $3 million for MICRO (Microelectronics Innovation and Computer Research Opportunities). This provides industry / university matching grants for research in basic microelectronics and an engineering and computer science scholarship program.

Governor Brown also allocated $2.3 million to equip Cory Hall at U.C. Berkeley with a state of the art microelectronic fabrication facility.

Investment in People in Employment Development

$9.2 million was provided for training displaced workers and employment services to welfare clients. This has funded:

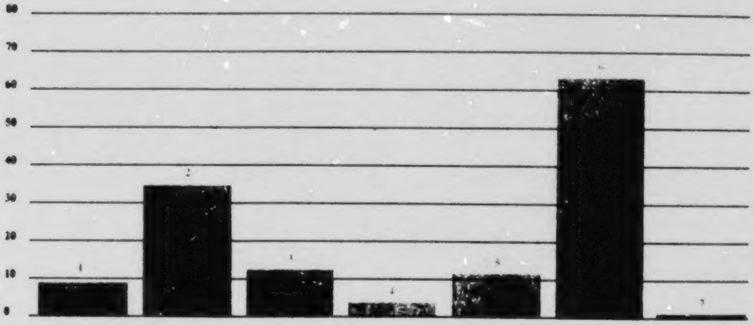
- More than 20 Displaced Workers Reemployment Centers around the state. These centers are set up on a temporary basis to respond to immediate local needs. The largest project serves 10,000 displaced workers at a total cost of $8 million including additional funding from State of California, General Motors, United Auto Workers and the federal government.
- Expansion of the Employment Preparation Program by $7.2 million to assist welfare applicants find jobs rather than going on welfare.

On September 10, 1982, Governor Brown signed legislation initiating a landmark training program. Under the new law, $55 million a year will be allocated from the Unemployment Insurance Fund to prepare Californians for jobs in growth industries. A seven-member panel will contract directly with employers and schools for necessary services. Like CWETA, emphasis is on employer commitment to hire after training.

Investment in People in Private Industry

$.9 million funded four *Business/Labor Councils* in Orange County, Los Angeles, Ventura and Alameda Counties. Composed of top business, labor, education and local government leaders, the Councils are working to see that vocational training programs in educational institutions in fact prepare students for jobs that exist in the marketplace.

INVESTMENT IN PEOPLE 1982-83



1. Public School Math, Science and Computer Instruction	$ 9.7 million
2. California Conservation Corps	$35.0 million
3. California Worksite Education and Training Act (CWETA)	$12.0 million*
4. Community College Employment-based Job Training	$ 4.3 million
5. University Engineering and Computer Science Education	$10.1 million*
6. Training and Retraining Programs	$64.2 million
7. Business/Labor Partnerships in Job Training	$ .9 million

*Includes private sector matching funds

Chairman Stark. Thank you very much, Governor. As usual, you lead off on programs that I think are innovative and challenge us to keep California in the forefront in terms of excellence in education and in new technology and in new ways of living which will hopefully make the world a better place or set an example as to how to make the world a better place to live in.

I appreciate you being with us.

Mr. Brown. Thank you, and if anyone is interested, there is a handout here called "The California Computers in School Project." It describes an organization that brings together the manufacturers, the teachers, the administrators in an effort to make sure the tax credit effort really is productively employed in the schools. It is a private-sector, nonprofit activity, but it shows the tax credit, combined with private-sector efforts really can make the difference.

Thank you very much.

[The handout follows:]

CALIFORNIA COMPUTERS IN SCHOOLS PROJECT

The California Computers in Schools Project is a demonstration project of the National Commission on Industrial Innovation. The California Computers in Schools Project promotes and coordinates corporate donations of computers to schools by creating a new network of manufacturers, teachers, administrators and parents. The California Computers in Schools Project manages The Electronic Learning Exchange (TELE), an electronic network for California educators. Kaypro and Texas Instruments have donated equipment to support the management of the electronic network, and Compuserve Information Services is providing accounts at reduced subscription fees to California educators.

Since January 1983 when the Computers in Schools tax credit (A.B. 3194, Imbrecht) became law in the State of California, national computer corporations have shown a great deal of creativity and imagination in responding to the law's opportunities. During the first ten months of the California Computers in Schools tax credit almost 10,000 computers were donated to schools in California.

Apple Computer initiated its "Kids Can't Wait" project with donations of almost 9,000 Apple IIe systems, one to almost every public and private school in California. The computers were distributed to the schools by Apple dealers throughout the state. The dealers provided an orientation session in conjunction with each donation. In addition, the Apple Education Foundation aids in teacher-training and basic research.

Atari has made donations of 39 computer systems plus software and cash for purchasing peripheral equipment to schools in California since January 1983. These donations augment prior donations made by the Atari Institute for Educational Action Research to schools participating in their projects. These include the "Sisters Schools" project, the "Home-School Networking Project" and the "Animation" project at Rowland High School in Los Angeles.

Commodore Business Machines has donated 320 computers to schools in eleven California school districts. Each school has received 16 units to be used in establishing a complete computer laboratory. In addition, Commodore is establishing five educational dealers in California and is offering a maintenance training program for school districts with Commodore equipment.

Hewlett-Packard launched its "Grants for Instruction in Future Technologies" (GIFT) initiative which placed full personal computer systems, teacher-training sessions and technical liaison support in 14 selected California high schools (value, approximately $700,000). Hewlett-Packard chose model schools with high enrollments of MESA students. These are female and minority students receiving scholarships and academic counseling from the Math Engineering Science Achievement program conducted by the Lawrence Hall of Science at the University of California at Berkeley.

IBM employed the Educational Testing Service to design their "Model Secondary School Project". They are donating computers to schools in Florida and New York as well as California received donations of 15 IBM PC's, extensive teacher-training and $5,000 worth of software. Before the computers were sent to the schools, the teachers were required to attend extensive training programs.

Kaypro began its "Kaypros for Kids" program with donations of over 400 computers to middle, junior and senior high schools in San Diego County (value: approximately $700,000). Each computer is accompanied by a complete software package, and Kaypro provides teachers with orientation and inservice training. Additional Kaypros have been loaned to the San Diego chapter of Computer Using Educators and are being used for an electronic network to support participating teachers. "Kaypros for Kids" has announced Kern County as its next site for school donations.

As a complement to the computer manufacturers' donations programs, Radio Shack is offering free teacher-training classes to every school in the United States. The training is called "America's Educational Challenge" and would normally be valued at about $200 per teacher.

For further information, please contact Judith Johns Hubner, Director, California in Schools Project.

NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

CALIFORNIA COMPUTERS IN SCHOOLS PROJECT

> *"Now it was a miracle beyond the dreams of any poet, a charmed magic casement, opening on all seas, all lands. Through this window could flow everything that Man had ever learned about his universe, and every work of art he had saved from the dominion of Time. All the libraries and museums that had ever existed could be funneled through this screen and the millions like it scattered over the face of Earth. Even the least sensitive of men could be overwhelmed by the thought that one could operate a Comsole for a thousand lifetimes—and barely sample the knowledge stored within the memory banks..."*— Arthur C. Clarke, *Imperial Earth*, New York: Harcourt, Brace, Jovanovich, 1976

BACKGROUND

American economic leadership requires a trained, creative workforce, with a level of skill second to none in the world. We must invest in our future generations and bring a halt to the under-education of American youth and the under-preparation of the American workforce.

Computers are becoming an increasingly important tool for enhancing the intellectual capacity of our students. As Americans of previous generations have been world leaders in the development and use of machines to increase our muscle power, so will future generations keep America in a position of world leadership in the development and use of computers to enhance our mental power.

The unique contribution of the microcomputer is that it creates a personalized, non-judgmental learning environment. In contrast to the typical teaching environment in our over-crowded, under-funded schools, computers work with students on an individual basis, in particular helping the student who has fallen behind his peers by adjusting to his pace of work and evaluating his responses in a neutral fashion. For the gifted student, computers open new avenues of knowledge and provide new thought patterns for analyzing and using information. All students can also learn practical skills such as word processing and mathematical spread sheets.

THE CALIFORNIA COMPUTERS IN SCHOOLS TAX CREDIT

California leads the nation in landmark legislation providing a tax incentive for donations of computers to

Photographer Mark Tuchman

NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

CALIFORNIA COMPUTERS IN SCHOOLS PROJECT

schools. The Computers in Schools tax credit (A.B. 3194, Imbrecht) was signed by Governor Brown on September 29, 1982 and will sunset June 30, 1984. The law allows a state income tax credit equivalent to twenty-five percent of fair market value of any contribution of computers, equipment or apparatus to California public and private schools for instructional purposes.

In addition to the tax incentive, corporations have found that donating computers to schools is both good business and good community service. A recent study found that student familiarity with computer brands used in schools lead to expanded sales both to the educational market and to the secondary home market (International Resource Development, Inc., 1982). According to a recent poll 91 percent of American parents believe that children should be trained on computers. Student familiarity with computer brands could make a major difference in the market sales enjoyed by a given company over the next decade.

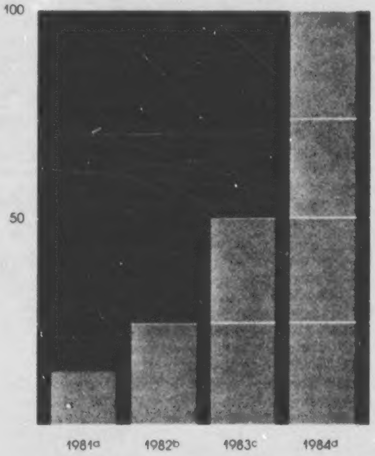
THE CALIFORNIA COMPUTERS IN SCHOOLS PROJECT

"The California Computers in Schools Project serves as a lifeline for manufacturers who are trying to get machines into schools."—Lillian Heller, Director of Educational Marketing, Kaypro Computers.

The California Computers in Schools Project, working with an Advisory Board of California's major educational organizations, helps individual corporations develop strategic plans for donating computers to schools; identifies needy schools and existing programs which would benefit from additional equipment; advises federal and state legislators on current policy issues related to the introduction of computers into schools; and manages The Electronic Learning Exchange, California's only statewide, public access, electronic information exchange on computer education.

Current projections estimate that up to 20,000 new computers will be donated to California schools by the end of the next school year. Plans for educational donations have been announced by several major computer manufacturers, such as Apple, Atari, Hewlett-Packard, Kaypro, Radio Shack, Texas Instruments and IBM. Information on corporations plans and activities is disseminated to educators throughout California via newsletters, statewide conferences and local seminars.

PERCENTAGE OF SCHOOLS IN CALIFORNIA WITH AT LEAST ONE MICROCOMPUTER



a Source: Market Data Retrieval, 1981
b Source: Market Data Retrieval, 1982
c 1983 estimate based on 1981-1982 growth rate of 1.88
d 1984 estimate based on projected donations

NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

CALIFORNIA COMPUTERS IN SCHOOLS PROJECT

Strategic Plans

The California Computers in Schools Project helps individual corporations develop strategic plans for donating computers to schools:

- state-wide distribution or geographic focus
- one school or an entire school district
- reading, writing, math, science, business education, computer science, music, art, social studies

Donation Prospects

The California Computers in Schools Project helps corporations find schools which are ready to use computers

- enthusiastic teachers, principals, parents
- bilingual students, gifted students, handicapped students
- inner city schools, private schools, rural schools

The Electronic Learning Exchange

The California Computers in Schools Project manages The Electronic Learning Exchange (TELE):

- TELE is California's only statewide, public access, electronic information exchange on computer education.
- TELE can disseminate information on corporate donations plans to subscribing members.

Advisory Forum

The California Computers in Schools Consortium serves as an informal educational advisory group to the CCIS.

- Monthly meetings from September through June serve as a forum where corporations can discuss their donation plans with representatives of California's major educational organizations.
- Corporate representatives are invited to attend as observers, to seek assistance in the development of a donations program and to announce fully formulated plans.
- During the first half of 1983 the Consortium met with representatives from Apple, Atari, Hewlett-Packard, Kaypro, Radio Shack, Texas Instruments and ETS/IBM.
- Information on corporations' plans and activities is disseminated to educators throughout California via newsletters, statewide conferences and local seminars.

NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

CALIFORNIA COMPUTERS IN SCHOOLS PROJECT

The following groups are regularly represented on the CCIS Advisory Board:

Teacher Education/Computer Centers (TECCs)
Far West Laboratory for Educational Research and Development
California State Parent Teacher Association (PTA)
State Department of Education
Computer Using Educators (CUE)
Industry Education Council of California (IECC)
Association of California School Administrators (ACSA)
California Association of Bilingual Educators (CABE)
California Association of Private Schools Organizations (CAPSO)
California Federation of Teachers (CFT)
California School Boards Association (CSBA)
California Association of Compensatory Educators (CACE)
California Teachers Association (CTA)
United Teachers of Los Angeles (UTLA)
California Association for the Education of Young Children (CAEYC)
Math, Engineering, Science Achievement (MESA)
Educational Products Information Exchange (EPIE)

NATIONAL COMMISSION ON INDUSTRIAL INNOVATION

The California Computers in Schools Project is a demonstration project of the National Commission on Industrial Innovation, a nonprofit, tax-exempt foundation. The NCII is developing a national strategy to promote industrial innovation based on a new partnership of business, labor, government and education. One component of this strategy is commitment to excellence in the education of our youth.

For further information, please contact:
Judith Johns Hubner, Director
California Computers in Schools Project
1125 West 6th Street, Suite 300
Los Angeles, CA 90017
(213) 481-0205

NCII

Chairman STARK. Thank you very much.

I would like for the record to announce that Congresswoman Burton, who serves on the Labor and Education Committee of the House of Representatives, had asked to submit a statement for the record. She has been involved in legislation for vocational training which parallels the interests of this committee's bill. Without objection, the record will remain open for the insertion of the statement.

[The statement follows:]

STATEMENT OF HON. SALA BURTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

I appreciate the opportunity to express my views on the Computer Contribution Act.

Our nation's commitment to public education has been renewed. We are now ready to move forward with improvements at all levels of our education system. We are also, without doubt, facing a significant challenge. As we are all painfully aware, the resources of school districts, across the country, are strained to the point of near collapse. The Administration, while calling for meaningful improvements in the quality of American education, has, for three straight years, proposed deep cuts in federal funding for education programs.

I am confident that a vigorous level of cooperation between government, business and the academic community will revitalize public education. The Computer Contribution Act promotes that spirit of cooperation. By providing this simple tax deduction we will be encouraging companies to donate state-of-the-art computers to schools that need them and could not otherwise afford them.

Computers have become important learning tools and an integral part of our lives. By increasing our nation's students' access to these tools we will be vastly increasing their potential for inquiry. We will also be providing them with skills they will need in the future. By some estimates, the number of computer-related jobs will increase to 30 million by the year 1990.

This legislation would benefit our school systems at a low cost to the federal government. A similar California law has made thousands of computers available to students. I would like to commend my colleague for his efforts on this bill.

Chairman STARK. I am going to call a panel out of order at this point. It is very difficult for me to remember back when I was a student because it was a number of years ago, but I am sure that whenever I was a student, I would have been bored to tears listening to a lot of discussion of tax credits and other such gobbledygook so to spare the pain for those students in the audience who have come to testify, I will move them up. I think we have a panel—and I hope the other witnesses here will bear with us as we do that—but I have Joan Targ, the president of Interactive Sciences; Ms. Alwine Fenton of Hayward, Calif., a teacher and an active member in the education community; and Thomas Heineman, coordinator at the Instructional Materials Center in the Livermore Valley Joint Unified School.

They have with them, I believe, some students. I am going to ask them all to come up here and we will move the microphones a little bit and we will hear from that panel. We will proceed then to the stuffier and more technical testimony that will make up our record following.

Alwine, do you want to come up with your guests and the rest of the panel and we will proceed. Come on up.

For the reporter, on my far right, we have Ms. Joan Targ. Would you introduce the person accompanying you, please.

Ms. TARG. Yes. I would like you to meet Chris Thacker, who is a 10th grade student at Palo Alto High School in the Palo Alto Unified School District. She is 14 years old and has been working with computers at least since seventh grade——

Ms. **Thacker**. Since sixth grade.

Ms. **Targ** [continuing]. Since sixth grade. She is both a student and, as all of our students are, she is a colleague as well.

Chairman **Stark**. On my immediate right is Ms. Alwine Fenton of Hayward. Alwine, you are accompanied by a guest. Would you introduce him.

Ms. **Fenton**. Yes. I am accompanied by a fifth grade student in my GATE class, Young Kim. He has just worked on the computers about four times, right?

Master **Kim**. Yes.

Ms. **Fenton**. OK.

Chairman **Stark**. How old is he?

Ms. **Fenton**. How old are you?

Master **Kim**. Ten years old.

Chairman **Stark**. Thank you.

I guess I would ask Joan Targ, if you have a prepared statement, if you would like to proceed, you are first on the witness list and then——

Ms. **Targ**. Fine.

Chairman **Stark**. Go ahead.

STATEMENT OF JOAN TARG, PRESIDENT, INTERACTIVE SCIENCES, INC., ACCOMPANIED BY CHRIS THACKER, STUDENT

Ms. **Targ**. My name is Joan Targ. I represent Interactive Sciences. It is a nonprofit, public-benefit corporation working with computers in schools developing curriculum materials and strategies for the use of computers. At the same time, I am director of the computer center at Jordan Middle School in Palo Alto, which serves as both a research center and as the computer center for 900 youngsters in our school, and during any given year, we work with approximately 800 of these youngsters.

The last thing that we are engaged in is an institute for educators at Stanford University during the summers where we train people to become resource persons for schools and for districts. This is done in conjunction with the Stanford University School of Education.

As a result, I want to thank you very much for allowing me to take part in discussions about this bill which is going to affect all of us so very much. The computer is a versatile, enormously important tool. It belongs in schools, it belongs in homes and I think there are very few of us here who would question that.

It serves for the teacher to individualize work for their students, for their youngsters. It also allows some of the kinds of things to be taught that we never could teach well before. For the students, it has the same benefits, but in addition to that, it introduces them to the world that they are going to be living in, not only in terms of their own use of the computer for their purposes, but the notion of dealing with technology in an effective way and turning it to their own uses over their entire life spans.

Ideally, students should be able to—or rather schools should be able to purchase computers that are appropriate and inexpensive.

There should be software that is also inexpensive and appropriate for them and they should know how to use them. There should be people in those schools who know how to use the computers in effective ways.

Unfortunately, this is not the case. The Stark bill offers the opportunity for industry and for the Federal Government to cooperate in trying to make some of those things happen, bringing computers into the schools.

There are a number of issues that are involved in that and some of these are issues which I hope others will address. They deal with fiscal policy, with support of education in general by the Federal Government. One of the hopes that all educators have is that somehow this will not be seen as extra funds coming into the schools replacing something else.

There are also issues in dealing with effectiveness of the tax incentives and fairness for various kinds of computer manufacturers, some of whom are making profits in a given year and some of whom may not be.

Another issue would be that of peripherals. One of the things that we know in terms of dealing with our own situation in school is that peripherals can often account for up to half of a school's budget when relating to computer use. Included are such things as printers, modems, additional disk drives, and digitizing pads, all the kinds of things that may be manufactured by other persons than the manufacturer of the computer equipment that would be donated.

Another issue is that of geographic and economic equity. One of the things that we question with regard to the way the bill is put together right now is the inability of schools to cluster equipment from school to school. That results in some inequities within our own districts. I hope that others will deal with some of those issues.

Our expertise is in the area, not so much of fiscal policy, but rather, education. What we worry about primarily is what happens to those computers when they arrive in the schools. Who knows how to use them? What are the uses to which they are going to be put? Who deals with the complexity of introducing a whole new discipline into the schools in a way that is effective and that also moves with technology as it changes.

Those of you in this room who have been working with computers for the last 7 years know that things have changed enormously. We are no longer concerned about 4K boards; we are talking about the 556K boards and there are many, many issues the devolve about that. Those are not simple and it is not sufficient for a teacher to have a little bit of training in order to be able to effectively use computers.

There are many different areas in which computers should be used in the school, not just in the math classes, which is where they tend to be clustered. There are issues dealing with who uses them within the school, girls, boys, minority youngsters. How do you see to it that the whole spectrum of youngsters within the school have the appropriate introduction to computers?

In terms of software, it is enormously difficult for one teacher to try to sort out and go through all of the software that is out right now, and much of it very, very poor in quality. There needs to be at least one person within a school who has the knowledge and some time set aside to be able to followthrough on these things and help the other teachers.

Our strong suggestion would be that there be an inclusion in the Stark bill, some provision for teacher training, whether that be as a percentage of the donation that then goes to the State departments of education or in other ways. It is enormously important.

Michael Kirst, who is the former head of the school board of education here in the State of California, has said that the last successful innovation in the school was the blackboard and the movable desk. We would like very much for computers to be the next successful one, one that takes hold and is well used.

Thank you.

[The prepared statement follows:]

Statement of Joan Targ, President, Interactive Sciences, Inc.

SUMMARY

There is no question that American schools need more computers. But Federal spending on computers for education makes little sense without guarantees that schools will have the knowledge to use these computers wisely. In fact, dollar for dollar, schools benefit far more from investment in training teachers to understand how to best use computers than from any purchase, discounted or otherwise, of computer hardware or software!

Because the computer is such a versatile and powerful tool with broad ranging implications for the school and for all of society, it is enormously important that children have computers in their schools. Equally important are concrete strategies and curriculum for use of these computers. There is a critical need for people who can carry these programs out in a realistic and dynamic manner, one which takes advantage of the computer capabilities still unfolding and which integrates their use into the school as a whole.

Our experience with thousands of youngsters and hundreds of educators makes this clear. After a "seed" teacher is trained, a school can establish programs to teach computer literacy, programming, and the use of advanced software. The cost of the training is less than the cost of a single computer, yet it allows each computer to serve three to seven times as effectively. In other words, thousands of dollars of hardware and software costs can be saved by investing a small amount in teacher training.

A knowledgeable teacher brings more than economy. He or she also creates a setting in which students of different backgrounds, abilities, and interests can learn. Without thoughtful strategies, computers in the school remain the province of the "Whiz Kid," relegating the vast majority of youngsters to video games and rote drill and practice.

BACKGROUND

Interactive Sciences, Incorporated (ISI) is a nonprofit public benefits corporation concerned with research and dissemination in the field of computers and education. We work closely with schools, Stanford University, the California State Department of Education, with foundations and with industry. Last summer we held two separate intensive five-week Institutes on Microcomputers in Education jointly with the Stanford University School of Education on the Stanford campus. Over two hundred educators attended, more than half on full or partial scholarship.

In addition to work in teacher training Institute, we direct the computer center at Jordan Middle School in the Palo Alto Unified School District, a school of approximately 900 seventh and eighth grade students. Using a minimum of computer and staff resources, we work with approximately 800 of the 900 youngsters in a given year, teaching computer using skills such as programming, word processing and spreadsheet analysis. The center also functions as a research laboratory for development of curriculum and strategies for introducing, evaluating and integrating new technologies as they appear.

As a result, we are vitally interested in the effects of the equipment distributions prompted by passage of the Imbrecht bill by the California Assembly this last year, in particular as it may be followed by similar legislation at the federal level. The nation can benefit by the clear understanding of both the shortcomings and the successes of the California experience.

ISSUES

There are a large number of issues which must be analysed and dealt with. These include national policy with regard to support of education, effectiveness of tax incentives to computer manufacturers and equity of tax structure so as not to favor some manufacturers over others. Provision for donations of much needed computer peripherals such as printers, disk drives, networking hardware, etc. should be considered, especially given that these are often supplied by companies other than the computer company itself. It thus raises the basis cost of the final product beyond what it need be if donated by the original manufacturer instead of the computer company.

A major issue is that of geographic and economic equity in any distribution. Although schools across the nation suffer from inadequate funding, suburban districts which serve middle class youngsters have found ways to bring computers into their schools, while inner-city and rural schools which serve low-income and minority students have far to few. Despite the seeming fairness of the "one school, one computer" formula, it hardly seems equitable that an inner-city high school serving three thousand youngsters receives its first (and only) computer while a suburban elementary school of 300 receives its sixth.

These same problems occur within districts as well. We question the reasoning behind not permitting districts to cluster equipment. This would offer flexibility within the district permitting equitable distributions. If equipment comes from multiple donors, or a school already has a computer, the problems resulting from mixing brands could be resolved.

We hope that others will speak to these and other important issues.

TEACHER TRAINING

Beyond hardware, and all of the critical considerations surrounding it, is the issue of teacher training. Lack of teacher training, not lack of equipment, is the primary bottleneck preventing effective use of computers in the schools. There must be at least one person within each district (and preferably school) who has a broad background in educational uses of the computer, who can make informed decisions about hardware acquisition, setup and maintenance requirements, software programs for a variety of applications, and computer assisted instructional packages for the many different subjects and levels to be found in any school. Because computer technology is so new and changes so rapidly, schools must have trained personnel to follow new developments as they occur and help others do the same.

Without provision for training such teachers, many computers (and taxpayers dollars) are wasted. Along with waste of the equipment goes the waste of child years and loss of opportunities for our youngsters to learn to use this revolutionary tool.

Some computer companies have recognized this need and have made provision for training. But counting on computer stores for teacher training is no solution. Aside from their own difficulties in keeping trained personnel and their lack of contact with the realities of the school situation, visiting a computer store often results in a pitch for sales. IBM has set up experimental teacher training centers in three states along with their donations of computers for selected schools. This is a promising approach and bears watching.

RECOMMENDATION

We strongly recommend that provision for funding teacher training be included in this bill. One possibility is to require that a percentage (in dollar) of the hardware value donated go to the State Departments of Education for a training fund.

The federal government, the schools, and the computer companies are joined in solving a common problem, that of finding ways to allow our children to benefit from the use of an exciting new tool. Supplying computers is only half the answer. To make that solution a reality, we need not only equipment, but educators with the training to make it work.

[From the Wall Street Journal, Apr. 7, 1983]

MANY SCHOOLS BUYING COMPUTERS FIND PROBLEMS WITH USING THEM

(By Burt Schorr)

POMPANO BEACH, FLA.—Many schools are learning that there's more to teaching with computers than buying the machines.

Tedder Elementary School here last October acquired three Apple II Plus microcomputers. They were among 900 Apple IIs that the Broward County school system purchased under a $2.1 million computer-expansion program. But only a few of Tedder's 520 students and 30 teachers have even tried the new machines. Computers aren't likely to have a major role at the school anytime soon, says Tedder's principal, Robert Snyder.

One reason is a lack of instructors and instruction time for teachers. Another is that the county hasn't allocated any special funds to buy the software programs to use with the computers. Tedder owns only two computer-program disks, which Mr. Snyder bought with $60 from a small school fund; the disks are intended to instruct second- and third-graders in telling time and counting money. But Mr. Snyder says that until he decides on the disks' instructional value, only three gifted students will use them.

As schools rush to computerize U.S. classrooms, many find themselves in a similar predicament. The problems often persist even if the schools have the money to buy the programming for the computers.

BEHAVING THE WRONG WAY

Under pressure from parents and school board members to begin computer instruction, "schools are behaving in exactly the wrong way," contends Phillip Mackey, an official of the School Boards Association in New Jersey, a state where many local districts have invested heavily in computers. "First they buy the machines. Then they buy the software," Mr. Mackey says. "Then they start to think, 'Why did we get into this in the first place?' "

Inadequate planning is common. Computer-education consultants say a frequent error is failure to equip at least one classroom with a minimum of one computer for each two students, typically 12 to 15 machines.

One Southwestern U.S. school district with 50,000 students recently considered a $2.5 million computer plan that would have provided its elementary and junior high schools with only a single computer apiece for "computer literacy" instruction. Noting that the plan would limit students to just two hours of computer work annually, advisers from a local university told district officials that "they'd be better off using the money to buy the kids crayons," one of the advisers recalls. The district decided to rethink its plan.

Teachers also complain about much of the software that is available for classroom computers. They contend it is too heavily oriented to mathematics and to drill and practice exercises that do little to challenge students' powers of analysis.

Gail Gallagher, head of the English department at Broward County's Coral Springs High School, says nearly all of the software she reviewed recently was "horrendous." One program that she flunked was an exercise in distinguishing between homonyms, such as "sun" and "son." The computer program failed to provide any remedies for students who repeated the same error over and over, she says.

Another flunker, she says, "flashed a great big red X" on the computer screen to signal the user's error. "That's like telling a kid, 'You dummy, you dummy.' " Mrs. Gallagher complains.

In a joint project of Education Products Information Exchange, a nonprofit organization in Watermill, N.Y., and Consumers Union, 300 teachers are evaluating classroom computer programs. Of the initial 50 programs reviewed, only a fourth got a grade of 60 percent or better. Many of the drill and practice programs failed, for instance, because they allow users to "guess their way through," says Kenneth Komoski, the Exchange's executive director.

Some school consultants wonder if the current enthusiasm for classroom computers will give way to the same disenchantment that has overtaken previous educational fads. But such skepticism is rare among parents, administrators and teachers.

"We in education have to recognize that we live in a computerized society," says John Bristol, superintendent of the Lyons Township high school district serving several suburban Chicago communities. The district's 3,700 high school students have access to 240 Radio Shack Model III microcomputers—one of the highest computer-student ratios in the country.

Lyons Township sees computer technology as "a subject to be taught" rather than as "a tool for teachers," Mr. Bristol asserts. All the same, the system has about 200 software programs for classroom use. One teaches music students guitar fingerings. Another teaches typing students how to use computers as word processors. A third, used in a health course, demonstrates the hazards of drinking alcoholic beverages.

More than a few students enjoy comparable computer benefits here in Broward County, where each senior high school has a minimum of 30 microcomputers and each junior high has at least 20. But under-used computers aren't hard to find, and the $2.1 million computer purchase has irritated many teachers. Teacher salaries here average $19,300 a year, and the school board recently imposed a labor contract giving teachers less money than they had hoped to get.

"It seems to the teachers that this county is dumping vast amounts of money for equipment nobody is using," contends Linda Pearson, a kindergarten teacher who serves on the board of the Broward County Classroom Teachers Association.

Despite such criticisms, the boom in classroom computers is expected to expand. At the end of last year, schools were using about 274,000 desktop machines, more than double the year-earlier total, and they will have nearly 1 million units by 1986, estimates International Data Corp., Framingham, Mass.

FREE TRAINING

Computer companies are encouraging the trend by trying to help overcome the lack of teacher training. In March, Tandy Corp. announced that it will provide public and private school teachers and administrators with up to 24 hours of free training at any of its 500 Radio Shack computer-training centers. International Business Machines Corp. says that it is giving 1,500 personal computers to 840 schools and 12 teacher training institutions in California, New York and Florida as part of an $8 million instructional program.

More than 600 producers of home-and-classroom computer-education programs are vying for shares of what is estimated to be a $150 million market this year and a much bigger market later. These producers range from individual teachers working at home to companies such as Milliken Publishing Co., St. Louis, a leading maker of classroom programs.

Many educators say some software seems to be improving but a number of school systems are learning the hard way that some highly rated programs may not be compatible with their specific computer system.

Michelle Annette, a special-education teacher at Homestead High School in Cupertino, Calif., says she liked the Milliken Math Sequences programs she tried at a recent software fair run by her school. "They go slow enough for my kids and cover what they need" in adding, subtracting, multiplying and dividing, she says.

Unfortunately, the Milliken math series won't run on the computers at Homestead High and other schools in the local Fremont-Union High School District. The Silicon Valley school system wanted to stretch its $275,000 computer investment as far as possible. So instead of supplying program disks for each of its Apple microcomputers it tied the 15 Apples at each school into a Corvus Systems Inc. network served by a single disk. But producers of school software design their copyrighted products with electronic "locks" to prevent their use with such networks, and only a few programs priced for network use have reached the market.

The district was gambling that "by the time we got teachers trained," the software problem would be solved, says Michael Summerbell, Fremont-Union coordinator of computer instruction. That hasn't happened yet, though, often forcing teachers like Mrs. Annette to use courseware they consider inferior that isn't copyrighted.

Milliken Publishing has promised "a network solution" by fall, though it has misgivings about network use of its programs. Bodie Marx, vice president in charge of computer software for Milliken, notes, for example, the company's $500,000 investment in its math series. "With an investment like that, it scares us to think that hundreds of students could work from one disk," he says.

Too many school systems are buying computers that can't be integrated with classroom work or existing equipment, says Marc Tucker, a Washington, D.C., analyst of classroom computer policies. Once delivered, the computers go "into the hands of teachers who are frightened by the machines and have no sources for learning how to use them," he says. Mr. Tucker's remedy: schools should allot only 25 percent of their computer funds to hardware and maintenance. Another 25 percent should be reserved for software. The remaining 50 percent should go for planning, teacher training and other support services.

Chairman **Stark**. Joan, thank you very much.

Alwine, if you have a prepared statement, it will appear in the record and you may summarize it or read from it or proceed in any fashion you see best.

STATEMENT OF ALWINE FENTON, TEACHER, EDEN GARDENS ELEMENTARY, HAYWARD, CALIF., ACCOMPANIED BY YOUNG KIM, STUDENT

Ms. **Fenton**. I agree with everything that the previous speaker said as far as what we need.

My testimony is strictly as a typical classroom teacher that suddenly entered the age of technology by having a computer plunked in her classroom. Two years ago, I started teaching a GATE class and one of the things that happily goes with being a GATE teacher——

Chairman **Stark**. Excuse me, but for the record, and for those of us, what is a GATE?

Ms. **Fenton**. Gifted and talented class.

Chairman **Stark**. Thank you.

Ms. **Fenton**. OK. One of the pleasant things that goes with becoming a GATE teacher is you do get an Apple II computer in your classroom. However, I became a GATE teacher before having had all the preparation to become an Apple or a computer teacher.

They put together the computer and the disk drive and the viewer and they left me. There I was with a beautiful, expensive piece of equipment, 32 children eagerly looking at me to use it, and I had never touched one before, let alone had any training.

Well, needless to say, that computer was not used wisely my first year. Luckily I had a friend who taught math in a computer lab in a high school who gave me some disks of some games and some drills and we used it that way. I was really frustrated.

It is easy to say that a person can learn to use the computer using the manual. I know that is possible, but when the computer stays at school and they lock the schools at 4:30 because there is no custodian at night, it is a little hard to have time during the school day to teach yourself to operate that computer wisely. I didn't have time. I teach math, reading, science, social studies, all the subjects to the children and GATE children are prolific in what they turn out and the correction time just didn't leave me time at school to work on this.

After taking four different computer classes at a personal cost of about $500, I felt I was adequately trained to teach the computers. But then I faced another frustration. There I was with 32 eager children and one computer, which is an almost impossible situation. Fortunately, I heard about a room full of Apple computers at the adult school nearby and the principal very graciously and bravely allowed me to take my children over there once a week for 6 weeks.

Well, it was a completely different world. In one session, they learned what it would have taken me over a month or two to get across in the classroom. It seems that college classes and TECC centers—and by the way, I am all for these new TECC centers, they are marvelous—but they came after I went through this experience——

TECC centers limit their enrollment so that there are only two to a computer, but an elementary teacher is supposed to be able to teach computers with one computer. That is like asking you to teach typewriting with one typewriter. Sometimes I think that a computer is thought of as another piece of audiovisual equipment, such as the projector or a stereo or the phonograph, but there is a great difference. All of those pieces of equipment serve the entire class at once, whereas the computer must be handled by an individual. Maybe two can sit there or three can sit there, but it is used by one child at a time.

I was very fortunate again this year. The district decided I hadn't broken any equipment last year and I could write a program and get to take my children to the adult school every Wednesday again this year. We are doing basic now and after Christmas, we will go into logo. But unfortunately, I am the only class in the district doing this and we are really not supposed to be doing this because those computers belong to the adult school. But they are not used in the afternoon and it did seem like a terrible waste.

I added at the back of my statement a lot of statements from my children. I was told by Mr. Stark's office that they often hear testimony from teachers and business people and computer experts, but they never hear from the children, so I asked my children to write papers on what they thought of computer education and I just drew out some varying statements. I didn't include all the children because, of course, there was duplication.

I have a real concern that a computer should not become just a classroom toy or used as—in some cases I have heard, "If you are good all day, you get to use the computer as a reward." That is not what a computer is for. It should not become a babysitter for some child that perhaps is remedial and it is very nice to just place that child on a remedial math disk for hours on end. That is not education, either. However I am in favor of computers being used in remedial education.

I think everything I do with my GATE class could be done with regular, average children. I taught those children for many years. I know that they could do all the same things. The computers should not just be used with disks. I feel very strongly on that. However, we need the money for good disks that serve educational needs. They are marvelous for remedial work and for drill, but the child should become the master of that computer, not a robot sitting there only answering questions that the computer poses.

The child should know that that computer isn't able to think and it can't do a single thing without a human mind putting in the commands. I think for the future society—and they are all going to have to use them—I am pleased that we are getting the donation of computers. I do feel the frustration of the one computer. I put in my suggestions that it may be possible that they can be grouped so teachers can take their children to a computer center. I could take them to the Lawrence Hall of Science, but it costs between $300 and $400 for one trip. Schools haven't got that money.

I think what the previous speaker mentioned about having somebody trained with these computers would really help the teachers.

Eventually, all the classroom teachers, if they go along with their classes, will also be learning about computers.

[The prepared statement follows:]

Statement of Alwine Fenton, Eden Gardens Elementary, Hayward, Calif.

I became part of the technological revolution when I started teaching a GATE class. I'm representative of all the elementary teachers who suddently find that they have a computer in their classroom. Two years ago a beautiful Apple II arrived. The GATE supervisor helped assemble the unit. He left and there I was with thirty-two children and a very valuable piece of equipment. I had never touched a computer in my life. I had had not computer training whatsoever.

Luckily, I had a friend who taught in a computer math lab at a high school. He gave me a collection of disks involving a variety of subjects and some games. Needless to say, the computer was not used to its fullest potential during the school day.

After taking four computer classes, at the personal cost of around $500.00, I feel adequately trained to utilize a computer with children. While I was being trained the computer wasn't used correctly. We used the donated disks for some math and history drill and for games.

Once I knew how to teach programming, I felt another frustration. One computer and thirty-two children is an impossible situation. I would introduce a concept and the children would take turns all day using the computer. With thirty-two children some never got their turn until the following day. By then the objective of the lesson was a little foggy.

Fortunately, I heard about a room full of Apple II computers at a nearby Adult Education School being idle in the afternoons. The principal, Wally Copeland, generously (and bravely) let me teach my class in their lab one afternoon a week for six weeks. What a difference! We had two students on each computer. We accomplished in one afternoon what it would have taken at least a month to learn in our classroom.

All college or tech center classes limit their enrollment so that there will be only two students to a computer. (One to a computer is ideal.) Yet elementary teachers are expected to teach thirty-two children with one computer. It would be the same as asking a teacher to teach a class in typing with just one typewriter.

Sometimes I think a computer is looked upon as a piece of AV equipment such as the phonograph, film projector or television. The difference is that a phonograph, projector or television can serve a full classroom at once. The computer must be used by an individual.

This year, once again, I have arranged to take my GATE 4/5 class to the Adult School every Wednesday afternoon. The children work in pairs. They are learning BASIC. After Christmas we will work in LOGO. The class works from 12:15 to 2:20 PM without a break. The children love it. They concentrate and work hard. It is their favorite part of the week.

I'm thoroughly supportive of computer education if it is done correctly. Software to teach or drill subject matter skills is fine, but that should not be the only use of a computer. Children should learn how to direct the computer. They should learn that a computer only does what a human mind commands it to do. Children should not just sit passively and answer questions posed by the computer. Instead they should learn to think through problems using a computer as a tool. A child should master a computer, not be its slave. Although I teach a GATE class at this time, average students could succeed at doing the same things my class is doing.

Every student in our nation should have equal access to computer education. For some this may mean using a computer as an aid to mastering basic skills. For the majority this should be education to help the child become master of the computer, to be able to use one as an adult in this techonogical age.

SUGGESTIONS

1. Provide funds for adequate computer training for teachers now in the schools.
2. Students at teacher training institutions should receive training in classroom computer use.
3. Funds should be provided for software to fit the educational needs of students.
4. Encourage grouping of computers in labs. These should be at accessible locations or in traveling mobile units. These units would be wisely used if staffed by trained computer teachers.

STATEMENTS OF STUDENTS, 4/5 GATE CLASS, EDEN GARDENS ELEMENTARY, HAYWARD, CALIF.

Ian Reddoch, Gr. 5: I think that there should be a computer in every class, because computers run the world pretty much these days. Kids should learn to operate them now because they will have to operate them when they are grown anyway.

David Augustine, Gr. 4: I think that every school should have a computer because they are educational and fun. Computers are fun for games and they are educational because they could help you with math, reading, spelling, and lots of other things.

Sometime in the future we'll get a job and they will probably have computers to work with, so its good to know how to use one just in case.

Dalilah Rambo, Gr. 5: I feel that computers are being used wrong. A teacher will punch in a program and have the child do it. But actually the child should be telling the computer what to do and be learning from his or her mistakes.

If a computer is used correctly then the little boy or girl who walks up to one not knowing a thing could someday be a big-time computer programmer.

Dennis Mojado, Gr. 5: Computers are really growing during this year. They are getting smarter and better. But, we aren't doing anything about it. Just a few are learning. The others don't even know what INPUT will do. If we had several computers in each school and had daily or weekly education about them, we would be ready for the future.

Cheryl Mealer, Gr. 4: I think computers are a fun learning experience. When kids grow up they will know how to use a computer at work. The computers should be used properly. Students should wash their hands before they use a computer so they won't get it dirty. Teachers should cover it so it won't get dusty. I think all schools should have computers.

Abigail Aroma, Gr. 5: Every school in Hayward, I think, has at least one computer. They are good because in the future when you grow up and want a job you will probably have to have computer experience. What you get from a computer is an advantage!

Martin Sanchez, Gr. 5: I think the teachers, principals, Mom and Dads Clubs or PTA, and the Board of Education should invest a little money and buy from 30 to 40 computers and lock them up in a single room. Then one day of the school week classes could go to that special room for an hour or so to use the computers. . . . I think it is good for kids to learn how to program a computer. When he or she reaches adulthood, they will find a good occupation very early.

David Keller, Gr. 5: Computers are part of the modern world, and if children know more about computers, they will probably get better jobs when they grow up. Very few children have a chance to use a computer. If children don't use a computer when they are young, they will not be as good on computers when they're grown and will not get as good jobs.

Michael Jewell, Gr. 5: I think every school should have about 16 computers. They could put the 16 in an auditorium. Each class can have an hour to go there for two days a week. There could be two on a computer and if there's extras maybe a few could be alone.

They could learn stuff on the computers they are going to use for the rest of their lives. They could correct papers, learn the keyboard, and learn how to write a program. If they start learning now, they will never forget it.

Dean Quock, Gr. 5: With all these new computers coming out, and their rapidly falling prices, I believe that schools should take this wonderful opportunity. What can a superpower do if its citizens do not know how to operate a modern machine that will be used in the future?

Darin Hood, Gr. 4: I think every student should be properly exposed to a computer so when they grow up and go to work they will know how to use one. I think since some of the elementary schools have 5th to 7th graders switching classes, they should have a computer room that they go to for one half hour a day.

Justin McLloyd, Gr. 5: I don't think there should be a computer in each classroom like other people say, because it may take away class time and work. I think there should be a special room in the school for computers.

Beth Keller, Gr. 4: I think schools should have one computer room with a lot of computers in it. If there is just one in each classroom, it could cause a fight about who gets it next or first.

It is important that you learn how to work a computer when you're still young. When you get into higher grades such as high school, you should already know how to use a computer. It would be embarrassing to go to high school and start on a beginner disk.

Heather Zaitz, Gr. 4: I think computers should not be used for just anything. I think some people use the computer and not their heads.

Tilde Herrera, Gr. 5: I think having computers in the schools is great. They give kids a chance to get somewhere in the real world with computer technology. Kids that get to use computers get to experience things that they never knew existed. . . . Computers help to raise grades. Kids that aren't so bright that use computers will soon get brighter.

Becky Ortega, Gr. 4: Our class goes on a field trip every Wednesday for computers at the Adult School. All children need to learn about computers for the future. The future may be all computers. Children need that chance to learn about computers to have a good life.

Aarti Ahuja, Gr. 5: Well, I think that computers in the school is pretty good. It is good exposure for us kids. It is good to learn about computers because when you grow up you may want to be an engineer. If you need to solve a long eight hour problem, you could do it on the computer in one minute!

Jody Casey, Gr. 4: I think computers in school is a very good idea. It may even start a good career for students later on in life.

Ms. Fenton. Young Kim will answer any questions. He didn't come with a prepared statement, but you might like to know—he wrote a long paper and I didn't include his because I thought he could just tell it.

Chairman Stark. Sure, Young, maybe you could—I have looked at some of the statements that your classmates wrote. Maybe you would like to just tell us how you feel about it or tell us how some of your other classmates feel.

Master Kim. Well, I think it is pretty good because they teach the way—some people are saying that you are not using the computers right because you are using disks, but it teaches you and shows you what it is so you are never going to answer a question if you never knew the answer. So it is going to even encourage you just from the fun of going over the keys to learn.

Chairman Stark. Is it the most enjoyable thing you do in your class or do you like sports better or would you rather read a book? How do you feel? Do you not read any books because you spend so much time with the computer?

Master Kim. We hardly have any time to spend on the computer. There is only one computer and we usually do a lot of work.

Chairman Stark. So you still have to have a good book every once in a while?

Master Kim. Yes.

Chairman Stark. OK. Do you think that all the kids use the computer in the class as much or that some like it better than others or some are really scared of it?

Master Kim. It depends, like some people don't want to use it. Most people want to use it, but some people are just afraid of it.

Chairman Stark. What have you learned in the time you have had to use the computer? Have you learned something about math or something about how the computer can help you learn other things? What sorts of things have you learned?

Master Kim. We have mostly been doing programing for the computer.

Chairman Stark. Which is kind of math and logic, isn't it?

Master Kim. Yes.

Chairman Stark. Does it teach you to think more logically, do you think, about science or anything else?

Master KIM. It makes you learn because nobody is ever going to want to have syntax error coming on the screen every time. [Laughter.]

Chairman STARK. Particularly if they don't know what syntax error is and how to spell it.

It is not contagious, is it? [Laughter.]

Master KIM. No.

Chairman STARK. What is syntax error? Can you describe that to me?

Master KIM. It is like—well, a computer is not made to understand normal English so you have to punch in the commands like 10 print, something like that. It won't understand if you just print something unless it has it built into the computer. So if it doesn't understand, it writes out syntax error.

Chairman STARK. And that is bad.

Master KIM. It is kind of frustrating. [Laughter.]

Chairman STARK. OK. What other—let me ask this. Somebody said once—see what you think about this—that some kids are afraid to stand up in front of the whole class and answer a question because they are afraid they don't know the answer and they wouldn't want the kids to laugh at them. But if they are working with a computer, nobody can really see what they are doing and they are much—feel much more confident because if they make a mistake with the computer, they can keep trying and correct it and they are not so timid.

Is that—do you ever see kids who might be scared in class but they will just go to it with the computer?

Master KIM. Yes. Some kids do that because they know nobody is just going to come walking over from a different computer and say, "Oh, you got this wrong," and they start laughing at you. So they know nobody can do that except the computer might sometimes put you down.

Chairman STARK. Does the computer put you down? [Laughter.]

Master KIM. Sometimes, yes, especially after you run a real long program, it comes down syntax error.

Chairman STARK. I guess I had better find out what that is. That is sort of like being second in an election, is that it? [Laughter.]

Chris, did you have a statement, and if not, could you tell us a little bit about how you, I guess at the high school level, have been involved with computers and what it has meant to you and give us some advice, perhaps?

Ms. THACKER. Well, the computer, as I use it, is a fantastic tool in that one of the major uses I have for it is to write my papers. It doesn't write my papers for me, but I use editors which basically eliminate the rough draft and I can write more and it will be more extensive. It is much easier to go back and eliminate entire paragraphs or rewrite whatever you want to write without the—a hard copy is sort of concrete and you don't have—with a typewriter, you have just the one copy and then you have to go back and retype pages. With the computer, it is much easier to fix things like that.

I am writing a math fax program for my sister and really there are quite a few uses, such as—well, I am learning Pascal now, which will help me to write programs to figure out math formulas. I have one that solves equations and just as a tool—it doesn't take over what I am doing, but it is a great help in doing homework and things like that.

Chairman STARK. Chris, let me ask you this. In talking to your classmates or in your own opinion, do you think that your teachers, or the teachers that you talk about with your classmates are prepared to use the computers and to teach you how to use them or do you think that many of your teachers aren't very well prepared in that area? Are you willing to tell us?

Ms. THACKER. Well, let's see—the computer center that we have at Palo Alto High School consists of about 30 Apples and then one or two IBM's and one or two Ataris. We have one director who knows all of what is going on and then we have several students who are very well involved.

I am learning Pascal during lunchtime and the people there are very helpful, the students who know what they are doing. I am pretty much learning it from a manual but if I need help at all, I can go to them and they are very well informed.

Chairman STARK. OK. You mentioned, or I think Ms. Targ mentioned that there is equipment and programs that would be helpful to have. I can't recall right off the top of my head what types of equipment might be excluded under either the California law or under our bill, but what are the kinds of things that you would find useful to have in addition, either in programing or peripheral equipment that you don't have now that you think would be useful to yourself and other students?

Ms. THACKER. We have everything now running on a network which means that all the computers come off one hard disk, which is kind of efficient, but it would be better if we had a couple of disk drives to use a computer system by itself instead of having it on the hard disk because there are a lot of disadvantages with that. There are also many advantages and it is a lot less expensive, but a couple disk drives or a better editor would be helpful.

We have a Pascal program that works really well.

Chairman STARK. What is that?

Ms. THACKER. What?

Chairman STARK. What is Pascal. Is that a pasta sauce or is that? [Laughter.]

Ms. THACKER. No; it is not any kind of a food. Pascal is a computer language which is better than many of the computer languages around simply because it is faster and you can run things incredibly quickly. Assimilations or whatever.

Chairman STARK. You indicate to us that a lot of what you are using the computer for is to help you in other courses, English or history or science, in effect, to make you more productive. Is there anything just inherent in the computer itself and in learning to master it and in programing it that you find valuable in being isolated from the rest of the course work, or do you see it almost exclusively as something that is a learning and production aid in terms of letting you cover more material in other courses?

Ms. THACKER. No; it is great—it has helped greatly in helping me organize my thinking and it is a logic tool. Just any experience with a computer at all in programing helps your logic skills.

Chairman STARK. How is your syntax?

Ms. THACKER. Oh, my syntax is great. [Laughter.]

Chairman STARK. I could go on with this all day and maybe with a little more time, I would figure out what syntax is, too, but I would ask Alwine or Joan if they had anything they wanted to add to anything that Young Kim or Chris have said or any further comments.

Ms. TARG. I would like to mention, also, that Chris and many of the other youngsters in our school have been very active as teachers of teachers. Alwine, when you mentioned that you could have used help, one of the ways in which that help is forthcoming in our school, and at the Institute for Educators, Microcomputers, and Education during the summer, this help comes from knowledgeable youngsters. It is one of the strategies and techniques that can be introduced to the schools by people who have been trained, who have done some thinking about it, and that allows other youngsters in the computer center that Chris is in right now at the high school who have mostly been through the same program at the junior high school level, to help each other and act as colleagues. That is something that is going to be very important, not only in the schools, but in society as a whole, because whatever is happening right now with the schools, whatever is happening with computers and what they are learning will be very different 2 years from now and 4 years from then and 10 years from then.

We really have to teach these youngsters to take part in a learning society and to take information from wherever they can get it and to help others give information and keep abreast of what is going on.

Chairman STARK. I wanted to ask Chris what was your first contact with a computer. Where did you meet your first computer?

Ms. THACKER. I was 10 years old and in the sixth grade. The Palo Alto Unified School District got us three North Star Horizon computers and I was kind of in a pilot program. The first language I learned was basic and I stayed in during lunch and we wrote little games and did all kinds of fantastic things with that.

Chairman STARK. Do you have one at home?

Ms. THACKER. We have an IBM PC, yes.

Chairman STARK. And you go invading other computer networks like in "Wargames" and places like that?

Ms. THACKER. I don't have a modem. [Laughter.]

Chairman STARK. I am afraid to ask Kim the same question. [Laughter.]

Kim, where did you first get exposed to computers or when was the first time you ran into one or used one?

Master KIM. My friend had a computer. That was about when I was 9 years old.

Chairman STARK. Did he have it at home?

Master KIM. No.

Chairman STARK. Your friend had a computer at home or——

Master KIM. Yes.

Chairman STARK. What, one to play games on or one that you could do other things with?

Master KIM. A Commodore.

Chairman STARK. I see. OK. Do you have one at home now?

Master KIM. No.

Chairman STARK. You don't. OK, so you haven't gone sneaking into any of these networks.

Master KIM. No, not yet. [Laughter.]

Chairman STARK. Well, I want to thank you all. This is a holiday today, isn't it?

Ms. TARG. Yes.

Chairman STARK. There are probably a lot of things that you could find to do with a day off, and Alwine has one other—I might add, you know why it is a holiday today? Because it is my birthday, so we are all taking time off to be here when we could be doing other things.

Thank you guys very much.

Alwine.

Ms. FENTON. I did want to mention, I had parent conferences yesterday and the day before and I had many parents come in and say—I gave them a grade in computers just so they could see how they are doing and they said, "Well, my child said that he could do much better if he had one at home, that all the other kids have one." [Laughter.]

It is now the kind of thing they are saying that everybody else has one and it wasn't true. The children doing the very best do not have them at home; they have worked in the labs. I do want to stress that the teacher training—I did have a few children help me when I first got one, but it still was not the same as really having plans.

Now I have my own Apple at home. I can do lesson planning on what I am going to do with them in the lab. You can't take 32 children into a computer lab and not be prepared. I teach harder, I am ready for the showers when those 2 hours are over, racing around, either answering their questions or seeing what an excited child has produced. It is really a terrific tool. Thank you.

Chairman STARK. Thank you, Alwine, and I would indicate, as long as the copies last, we are going to ask that the Eden Gardens Elementary students' comments be made a part of the record, but for those in the audience who may find, as I have been glancing through, that they are fascinating, I think they are fascinating and I think there are copies on the press table if anybody would like them.

Thank you all for being with us this morning.

Ms. FENTON. Thank you.

Chairman STARK. We did skip over Dave Bossen, the president and chief executive officer of Measurex, and he is here representing the American Electronics Association. If you would like to come up, Mr. Bossen, and then we will have our next panel right after that.

You have a prepared statement, Mr. Bossen, and it will appear in its entirety in the record. If you would like to summarize it or add any comments to previous witnesses' testimony, you may and I will just let you proceed in whatever fashion you are comfortable with. Thank you for being here.

STATEMENT OF DAVID A. BOSSEN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, MEASUREX CORP., REPRESENTING THE AMERICAN ELECTRONICS ASSOCIATION

Mr. BOSSEN. Thank you, Mr. Chairman.

I think those youngsters said it all, much better than I am going to be able to.

My name is David Bossen, I am president and chief executive officer of Measurex Corp., a company which manufactures computer-based process control systems. We are headquartered in Cupertino and we employ over 2,000 people. I am a director of the American Electronics Association and chairman of its San Francisco Council. I appear here today on behalf of the American Electronics Association.

We represent over 2,300 growing high-technology companies throughout the country, all segments of the electronics industry, from startups to the largest companies in the industry. Seventy-two percent of our members are small companies employing fewer than 250 employees, but together, all of the companies in the association account for 140 billion in annual sales, which is 63 percent of the worldwide sales of the U.S.-based electronics industry.

We commend Congressman Stark for his introduction of H.R. 701. I would just like to make a couple comments in summary.

Computer technology, we believe, ameliorates the math and science teacher shortage. Teachers are more productive using computers and I believe that the students will learn. You saw these students were learning quite well. I am sure when I was in fifth grade, syntax error would have meant nothing to me. It doesn't mean a lot today. [Laughter.]

We think that there are some additions that would be helpful if they could be added to H.R. 701, such as those in H.R. 3098, Stark and Archer. We would suggest that the bill should be extended to a 5-year bill from a 1-year bill so that many companies can responsibly participate and provide these benefits for our students.

We would also suggest you revert to the current 10-percent ceiling for contributions. We don't think that it is really required to go to the 30 percent.

We would require donations of computer software and courseware and teacher orientation so that the teachers are able to use the computers. That is the same thing that I believe the previous witnesses were commenting on. It does very little good to give a black box to the teacher and then walk away from it. I think there would be a backlash against those donating the equipment if that were to occur.

We believe quite strongly that the electronics and information technology industries are important keys to economic growth in the country. Our forecasts are for a 49-percent job growth within our industry by 1987.

This growth, though, may be difficult to achieve if we are unable to attain sufficient numbers of engineering graduates from our universities. Competent good students, such as the students that you see here today, are unable to get space in engineering classrooms, primarily due to a shortage of engineering faculty.

We believe that the purpose behind H.R. 701 will be thwarted if students continue to be unable to pursue higher education study. We would suggest that H.R. 701 incorporate tax incentives for higher education as well as for K-12, for donations of teaching equipment by both manufacturers and customers including warranties and service contracts again; eliminate the rolling payment in the present R&D tax credit for research and education from the base period so as to encourage research donations to the universities; and tax incentives for fellowship-forgivable loans to develop new science and engineering faculty.

I want to emphasize also the importance of the permanence of the R&D tax credit under ERTA. As I said, we support the bill but suggest these modifications.

Thank you.

[The prepared statement follows:]

STATEMENT OF DAVID A. BOSSEN, PRESIDENT AND CEO, MEASUREX CORP., FOR THE AMERICAN ELECTRONICS ASSOCIATION

SUMMARY

AEA supports H.R. 701 to provide tax incentives to increase computer donations to K-12 schools. Computer technology not only ameliorates the math and science teacher shortage by teaching subject matter but increases students' computer literacy, helping them become employable and competently functioning adults in an increasingly technologically-based society.

Additions are needed to H.R. 701, such as those in H.R. 3098 (Stark and Archer) for K-12: extend to a five year bill, so many companies can responsibly participate; revert to current 10 percent ceiling for contributions; require donations of computer software/courseware and teacher orientation for immediately useable "turnkey" systems.

Electronics and information technology are keys to economic growth, promising a 49 percent job growth within high tech companies between 1983-87, creation of many more service and related industry jobs, and continuation of jobs in traditional industries through improved products and processes. This economic promise is jeopardized by insufficient numbers of skilled human capital—especially electrical and computer engineers—graduating from U.S. colleges and universities. Competent and interested students cannot find space in undergraduate classrooms primarily due to a shortage of engineering faculty and inadequate teaching laboratories. The purpose behind H.R. 701 will be thwarted if student continue to be unable to pursue higher education study.

H.R. 701 needs to incorporate tax incentives for higher education: for donations of teaching equipment by both manufacturers and customers with appropriate warranties and service contacts; elimination of the rolling payment in the present R&D credit for research and education from base period research expenses to increase R&D with universities; and for fellowship-forgivable loans to develop new science and engineering faculty, excluding from taxable income forgiveable amounts when they graduate and teach.

R&D expenditures relate directly to job growth and productivity. Permanence of the R&D tax credit under ERTA is essential. Extension of its application beyond research to teaching as a means to encourage increased private industry dollars for both K-12 and higher education purposes described above are provided by H.R. 3098 (Stark & Archer) and H.R. 3095 (Shannon and Archer), and in the Senate S. 1194 (Danforth) and S. 1195 (Bentsen and Chafee).

STATEMENT

Mr. Chairman and Members of this Distinguished Committee: My name is David Bossen. I am President and Chief Executive Officer of Measurex Corporation, a company which manufactures process control systems. The company, headquartered in Cuperetino, California, was founded in 1968 and currently employs over 2,000 people. I am a director of the American Electronics Association and Chairman of its San Francisco Council. I was formerly Vice President of Industrial Nucleonics in Columbus, Ohio from 1951 to 1967.

I appear before you today on behalf of the American Electronics Association. AEA represents over 2,300 growing high technology companies throughout the country. The Association's membership includes all segments of the U.S. electronics industry, including computer, telecommunications, defense, instruments, semiconductors, software, research, and office systems. The AEA membership includes companies of all sizes from "start-up" to the largest companies in the industry. Seventy-two percent are small companies, employing fewer than 250 employees. Together our companies account for $140 billion in annual sales—63% of the worldwide sales of the U.S. based electronics industry.

We commend Congressman Stark for his introduction of H.R. 701. While we believe in the merit of educational grants and allocations, we prefer the underlying principle in this legislation. By addressing and educational problem of national significance through tax incentives, the federal government provides schools with a financial multiple of what public funds would provide. Furthermore, it does so with a minimum of the overhead and bureaucratic costs involved in a federal grants program.

Although tax incentives as a way to address educational needs are unique at the federal level, they have precedent at the state level. California, for example, last year passed AB 3194 (Imbrecht) providing tax credits for companies donating new computers to elementary and secondary schools (K-12) and an enhanced deduction for companies contributing research equipment to state colleges and universities. AEA's support has been helpful in recently enacting AB 430 (O'Connell and Naylor) which is extending the tax incentive concept for two years to include donations of new scientific and computer equipment to higher educational institutions for teaching purposes. An urgent need exists for such incentives at the federal level as well.

NEW COMPUTER DONATIONS FOR K-12

In "A Nation at Risk: The Imperative for Education Reform," the recently released report of the National Commission on Excellence in Education, the quality of teaching in our public schools is viewed as woefully inadequate:

"For the first time in the history of our country, the educational skills of one generation will not surpass—will not even equal—will not even approach, those of parents." [1]

"The great educational heyday of post-Sputnik has been lost, "leaving a generation of young people ill-prepared for the new era of technology and global competition." The report concludes that "our very future as a Nation and as a People" is at risk." [2]

As producers of electronics products we have special cause for concern. These K-12 students are our future employees. Industry's and our nation's competitiveness will depend on them in the very near future.

Xerox Corporation estimates that 60 million U.S. workers will be linked to some form of "electronic work station" (using computers, video screens, and telephone lines) by 1990.[3] Predictions from the National Center for Education Statistics are no less disheartening. They assert that unless the declines in math, science, reading, and writing skills of K-12 can be turned around, the U.S. in the next decade will produce 1 to 2 million of the 2.4 million high school graduates who will lack basic entry-level skills for jobs.

This situation comes at a time when 48 percent of the teaching positions in math are either vacant or filled by uncertified teachers [4] and when there are less than 10,000 physics teachers in the nation's 15,000 schools districts. The U.S. currently lags fourth in scientific literacy behind the Soviet Union, West Germany, and Japan. Since 1969, graduating high school seniors taking college preparatory courses have dropped by one-third to 36 percent. Less than one in ten U.S. high school students take a one-year physics course. In the United States, 20 percent do not graduate from high school compared with 2 percent in the Soviet Union and 10 percent in Japan.

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[1] "A Nation at Risk." Members of the National Commission on Excellence in Education, Washington, D.C., 1983.

[2] "Can the Schools Be Saved?" *Newsweek*, May 9, 1953, p. 50.

[3] "Winning Technologies: A New Industrial Strategy for California and the Nation." California Commission on Industrial Innovation, State of California, September 1982.

[4] Ronald Kotulak, "Crisis: Heading for Scientific Illiteracy." *Chicago Tribune*, February 2, 1982.

NEED FOR COMPUTERS IN K-12 SIGNIFICANT

Currently, only one out of three U.S. public schools has access to a computer.[5] Twenty-two percent of the nation's 50,000 elementary and 60 percent of the nation's 25,000 high schools now have access to microcomputers.[6]

Industry sources estimate that the actual number of classroom computers available nationwide is only around 300,000—far too few to provide any substantive hands-on computer experience to the 37.5 million K-12 students. Last year's data validates this: only 13 percent (or 4.7 million) students logged an average of 9 hours of actual keyboard time during the 1981-82 school year.[7]

At the elementary level, the situation is worse. One third of the U.S. elementary school population gets 5 to 10 minutes of time on a computer each week.[8]

Against this unsatisfactory record, we need to remind ourselves that computer use by the education community has three primary benefits:

First, applications of computers help to make students "computer literate" so that they can understand and function competently as adults in a society that will increasingly use technology in all aspects of daily life. Second, computer use will help students operate and be comfortable with electronic process in the workplace—whether they go on to become highly educated engineers or secretaries using word processors and electronic mail. Third, at a time when a shortage of math and science teachers is extreme, computers offer a means to supplement classroom instruction in all disciplines. Through simulations and educational games, for example, students can be assisted not only to assimilate new information, but can be taught to think creatively and analytically.

The need is clearly demonstrated. For instance, one company in our Association has received 4,000 letters from schools describing a need for computers and a lack of funds to purchase them. Many member firms have received letters from schools which want to implement "computer awareness programs" because students are demanding them. Again, few of these schools are budgeted to buy computers.

Provisions for K-12 computer donations in H.R. 701 will provide incentives for companies to donate in amounts we believe will help make a major impact on the problem.

SUGGESTED ADDITIONS TO H.R. 701

While H.R. 701 goes far in its efforts to increase the computer literacy and educational capability of our nation's youth, we suggest it needs to go further. Congressmen Stark and Archer's H.R. 3098, "Technology Education Assistance and Development Act of 1983," for example, includes many of the provisions of H.R. 701 and additional ones which AEA members consider essential.

FIVE YEAR BILL NECESSARY

H.R. 701 requires that computers be donated during 1984 and constructed within six months of assembly. This will make it difficult for more than one or two companies to "gear up" production schedules within this short time frame. H.R. 3098, on the other hand, allows a five year period for contributions, necessary to allow many companies to join in this partnership effort and, through long-range planning, responsibly participate.

CURRENT CONTRIBUTION CEILING ADEQUATE

H.R. 701 raises the present one year maximum allowable charitable contributions from 10 perent to 30 percent of a corporation's taxable income. Present law appears adequate to allow companies to significantly increase donations to achieve a positive effect within K-12 schools. An extension of the bill to a five year period would ensure the adequacy of the present contribution ceiling and minimize a "hill and valley" revenue effect that might occur with a 20 percent ceiling increase during a one year period.

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[5] "Tech Invaders: School Survival Shifts to Center Screen." *Christian Science Monitor,* April 15, 1983, p. B1.

[6] "Instructional Use of Computers in Public Schools." National Center for Education Statistics, U.S. Department of Education, September 1982, p. 4 Table 2.

[7] *Ibid.,* p. 2.

[8] *Ibid.,* p. 11.

DONATION OF COMPUTER SOFTWARE

A recent article in the *Wall Street Journal* outlines the problem many K-12 schools are having finding money to purchase computer software to operate donated computer hardware. In many cases, schools have purchased computer terminals, but have failed to provide funds to buy software programs to operate them and sufficient courseware with which to teach meaningfully.[9] A provision in H.R. 3098 encourages companies to donate educational software, helping to ensure that donated computer hardware is usable as soon as received—a "turnkey" kind of system.

TEACHER IN-SERVICE/ORIENTATION

Only 11.2 percent of the nation's K-12 public school teachers actually use computers to teach students.[10] It is the interest of any company donor that donated equipment is fully and effectively used. "Sufficient" in-service training required in H.R. 3098 ensures that teachers become capable of operating the computer and associated software/courseware in order to be able to teach others to do so. The stipulation that the donor company and the recipient school work out an agreement relative to the number of orientation hours appropriately recognizes the diversity of computer-based systems that may be donated and the range of needs for orientation within the educational community.

NEEDS IN HIGHER EDUCATION

While we concur with the need addressed by H.R. 701 to increase computer literacy and basic competencies of young people, a shortage of faculty and instructional equipment within U.S. colleges and universities—unless redressed--will thwart these K-12 students from pursuing information-based careers. The problem is especially severe today for those attempting to get electrical and computer engineering bachelor degrees.

PLENTIFUL SUPPLY TODAY OF ENGINEERING STUDENTS

Members from the academic community serving on AEA's Blue Ribbon Committee on Engineering Education—Dr. Joseph Pettit, President of Georgia Institute of Technology; Dr. Karl Willenbrock, Green Professor of Engineering at Southern Methodist University; and Dr. Richard Atkinson, former Executive Director of NSF and now Chancellor for the University of California, San Diego—estimate that two out of every three qualified applicants to undergraduate electrical/electronic and computer engineering programs cannot presently gain admittance.

Students at the University of Illinois, Champaign-Urbana, for example, must score at or above the 97 percentile on entrance exams to be admitted to engineering programs. At Cal Poly, San Luis Obispo, a 3.7 GPA on a 4.0 scale is occasionally admitted but classified as "educationally handicapped." Most colleges are now limiting, capping, or cutting back enrollments. Many have been forced to raise admission requirements substantially. Most have increased class sizes to a point where the quality of education is impacted. From 1980 to 1981, 31 percent fewer engineering programs were given normal six-year accreditation. During this same period, 71 percent more engineering departments were asked to "show cause" why accreditation should not be terminated than have been asked to do so historically.

Once these capable engineering students are turned away, they are generally lost to other disciplines. San Jose State University calculates it has 1,000 students "holding" in other disciplines, waiting for engineering slots to open. Yet, currently a 33 percent technical and engineering faculty vacancy rate exists at this university, making it likely these students will have to continue on through the non-technical major pipeline. Neither the industry nor the country can afford to lose them. This is especially true when one considers demographics which indicate that for every four 16 year olds we have today, we will have only three by 1990. And more of these three will be females and minorities—two groups that have historically avoided courses and careers in math, science, and engineering.

The problem, therefore, is not a lack of interested and capable students but primarily a shortage of faculty and teaching equipment.

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[9] Burt Schorr, "Many Schools Buying Computers Find Problem with Using Them." *Wall Street Journal*, April 7, 1983, p. 27.

[10] Sally Reed, "Bringing Technology Into the Classroom." *This World*, April 1983.

FACULTY SHORTAGES A MAJOR PROBLEM

As stated, faculty shortages constitute a major bottleneck in the production of new engineering and high technology personnel. Currently, 10 percent (or some 2,000) engineering faculty positions are vacant; half have been vacant for over a year. Vacancies approach 50 percent in some high tech specialty areas, such as solid state, digital systems, and computer engineering.

This country needs 1,000 new engineering faculty each year through 1990 just to remain constant. Yet, we are producing only 450 annually.

CAUSE OF THE FACULTY SHORTAGE

While many students want to study undergraduate engineering, few U.S. citizens want to continue on for doctorate degrees in order to teach. Two factors serve as primary disincentives: low academic salaries compared with those offered by industry and inadequate teaching and research labs.

INADEQUATE FACULTY SALARIES

There is virtually no incentive today for a U.S. citizen with a bachelor's degree in electrical or computer engineering to go on for four-to-six years of costly graduate study in order to teach for a salary that begins between $19,000 and $26,000. The same student can go immediately with a bachelor's degree into industry at an annual salary between $23,000 and $29,000. And should a student continue on to recieve a doctorate degree, choosing between the starting professor's salary and one ranging up to $35,000 in industry is usually an easy decision. A recent study of Southwest colleges shows that engineering faculty members who left academia for industry raised their salaries an average of $13,588 or 55 percent.

AEA and other groups are working on a state-by-state level with educational policy bodies and legislators to raise engineering faculty salaries. There is some preliminary evidence that they are gradually being raised.

INADEQUATE LABORATORY EQUIPMENT

In addition to low academic salaries, inadequate teaching and research laboratories make engineering professorships unattractive. A study conducted last year by the National Society of Professional Engineers placed the cost of modernizing and expanding engineering laboratories just up to the 1971 student level at $1,238,250. Considering that enrollments have almost doubled since a decade ago, to bring instructional labs up to the needs of students today places the price tag in the $2 billion range.[11] This sorry situation is a result of steadily declining budgets for capital expenditures.

For example, at the California State University and College system, funding for replacement of instructional equipment in engineering is less than 2 percent annually, requiring a 59-year life cycle to complete the replacement process. In Texas, State Senator Caperton recently introduced a bill in the state legislature to set up a $67 million fund for the purchase of engineering equipment to revitalize the State's engineering colleges and universities. Because technology is changing so rapidly within the industry—robotics, microelectronics, computer aided design, optics, spectrographics—many University laboratories are becoming so obsolescent that the technological future of the country is at risk.

Although a number of companies are already donating equipment to the college and school system, H.R. 3098 recognizes the need for additional private industry assistance in refurbishing U.S. education and research laboratories. The tax enhancements of this bill relating to scientific equipment donations for instructional use will act as incentives for manufacturers to invest capital equipment in the education and training of the U.S. technical workforce. The provision for donation of customers' equipment up to three years of age will be especially helpful to colleges where equipment is now all too commonly 15 to 20 years old. As the president of one Fortune 500 company remarked after a recent tour of a university engineering department, "The only time my engineers will see equipment of this tye is when they tour the Smithsonian."

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[11] "Engineering Education Problems: The Laboratory Equipment Factor." National Society of Professional Engineers, Washington, D.C., September 1982.

NEEDS OF COMMUNITY COLLEGES AND VOCATIONAL PROGRAMS

The problems of our four year institutions also exist at our U.S. community colleges: too few qualified instructors and outdated laboratory equipment, but an abundance of interested students. A 1983 survey of the California Community Colleges found that in engineering and electronic technology programs alone an estimated $20 million is needed to bring instructional laboratories up to a quality standard.

Inclusion of community colleges and certain vocational subject areas in H.R. 3098 underscores the recognition of Congressmen Stark and Archer of the need the country has for trained technicians and service personnel. These institutions not only "feed" into four year colleges and universities, requiring parallel kinds of quality instructional capability, but they are commonly the first and last training grounds for the majority of entry-level employment, retraining, and upgrading for most of our country's workers.

SERVICE CONTRACTS AND WARRANTIES NEEDED

The inclusion of service contracts as "eligible services" in H.R. 3098 shows and enlightened perspective on the current state of university and pre-college school budgets. AEA has an active program through its Electronics Education Foundation to stimulate the flow of company resources—cash, grants, equipment, fellowship/loans—to universities. Cutbacks in education budgets are increasingly preventing our participating universities from accepting gifts of computers or CAD/CAM systems simply because these institutions do not have the money to pay for normal service and upkeep. Donation of normal warranty and service contracts for maintenance, repair, reconditioning, or services similar to those ordinarily provided by the company in a sale or lease will ensure that colleges and elementary and secondary schools receive instructional equipment which is immediately usable and serviceable for a reasonable period of time.

FACULTY DEVELOPMENT GRADUATE STUDENT FELLOWSHIP-LOANS NEEDED

Unless significant action occurs, our universities will lack the faculty to teach students how to use laboratory and research equipment. Fewer and fewer U.S. students are interested in teaching careers in engineering. The student doctoral pool from which faculty traditionally are drawn is shrinking. EE doctorate degrees have dropped by 39 percent—from 899 Ph.D/EE's in 1971 to 542 Ph.D/EE's in 1982. Computer engineer doctorate degrees awarded in 1982 were lower than those given six years ago and actually declined 19 percent over 1981—from 171 Ph.D/CEs in 1981 to 129 Ph.D/CEs in 1982.

Fifty percent of the doctorates awarded went to foreign students, two-thirds of whom are likely to return to their homelands after graduation. Currently, most applicants for entry level engineering faculty positions are foreign-born nationals. Twenty-five percent of all junior engineering faculty in the U.S. today received their bachelor degrees from non-U.S. universities.

As mentioned above, for U.S. citizens the cost of graduate education is almost always too high for the payoff of a teaching salary at the end of the doctorate. The provision in H.R. 3098 to encourage companies to provide fellowships and loans—the latter forgiven if the graduate teaches for a stipulated period of time—will go far to stimulate the interest of bachelor-degreed students to continue their studies. The provision to exempt from taxable income such gifts where they are given with a requirement to teach enhances the likelihood that the graduate will willingly enter the teaching profession.

UNITED STATES—A TECHNOLOGY BASED SOCIETY

Government sponsored basic research led to the developoment of key technological innovations—in semiconductors, computers, and telecommunications, etc.—that have changed the way the world thinks and conducts business. America's economy has been transformed over the last 20 years from a manufacturing to a non-manufacturing base. Labor-intensive production is increasingly replaced by processes that rely on new technologies—on brainpower rather than musclepower.

Just a generation ago, traditional industries such as agriculture, automobiles, and textiles accounted for more than half of our nation's exports and a quarter of our jobs. During this last generation, however, 9 out of every 10 new jobs created have been in the information and services areas. In 1981 a U.S. Commerce Department report showed that information technology accounts for 46 percent of the GNP and computer sales alone bring a $6 billion balance of trade surplus.

Technological leadership is this nation's single most important national resource. It is indispensable to the long term growth of our domestic economy, to U.S. competitiveness in world markets, and to a strong national defense. This technological advantage, however, is being challenged today as never before.

Twenty-seven years ago when the Soviets sent the first satellite into space, the U.S. responded with a major new commitment to accelerate science and technology. Equally important was the enlightened support for science education that accompanied our space effort. There followed two golden decades of technological development based on a robust partnership between industry, education, and government.

UNIVERSITY R&D AFFECTS TECHNOLOGICAL BASE OF COUNTRY

During the 1960's industry spent 7 percent of every research dollar on basic research. Yet, today it spends only 3.6 percent. Less than 15 percent of all R&D is done at U.S. universities compared to 20 percent in Japan. Industry currently accounts for only 3 percent of R&D dollars brought to universities, down from 11 percent in the 1950's. Yet basic research at universities—unlike the more proprietary nature of R&D conducted in-house by a single company—encourages technological transfer which benefits many. University R&D needs to be encouraged.

Elimination of the rolling payment for qualified basic research and scientific education from base period research expenses, as provided by H.R. 3098, will stimulate and draw industry's attention toward universities. This augments the likelihood of increased dollars being translated into faculty salaries, graduate student fellowships, and equipment. Furthermore, it increases favorable outcomes in the development of innovative new products, new markets, and new jobs.

ELECTRONICS—ONE KEY TO ECONOMIC GROWTH

The electronics industry has had a phenomenal growth rate of 17 percent over the last decade. It currently ranks tenth among U.S. industry categories and is expected to rank second by the end of the century.[12] Sales of the top 100 electronics companies increased 46 percent between 1979 and 1981. Export sales totalled over $25 billion in 1982. This growth is reflected in the creation of a substantial number of U.S. jobs within the industry. Additionally, the electronics and information technology sector is a bright spot in the continuing creation of innovative and entrepreneurial new companies which have proven the major source of economic growth in the U.S. economy.

HIGH TECHNOLOGY CREATES JOBS

Recent publicity has highlighted an August 1983 report by the AFL-CIO titled "The Future of Work." The report refers to "high technology as an oversold promise to a nation suffering serious declines in basic industries like steel, auto, and chemicals; and asserts that computer occupations will increase by only 600,000 jobs by 1990.[13]

AEA's position is that high technology should not be expected to provide the single answer to America's economic vitality. What is commonly overlooked, however, is that it does act as a "key" engine of economic growth in three primary ways.

First, electronics manufacturers will continue to expand and create new jobs within their own companies. A 1983 survey of ASEA member companies shows a projected five year 49 percent growth rate in both technical and non-technical jobs. Infact, the 815 surveyed companies project a need for 335,058 new employees by 1987.[14] The significant growth projected by these 815 companies over the next five years is in marked contrast to the AFL-CIO projections for the entire decade.

Electronics and information technology companies show a clearly healthy growth for technical people through 1987:

Five-Year Growth of New Jobs: 1983-87

	Percent
Electrical engineers	66
Computer/software engineers	115

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[12] "Western Technical Manpower Council Report," Western Interstate Commission on Higher Education, 1983.

[13] AFL-CIO Committee on the Evolution of Work. "The Future of Work." Offices of AFL-CIO, Washington, D.C., August 1983.

[14] "Technical Employment Projections: 1983-1987 Report" The American Electronics Association, Palo Alto, California. 1983.

	Percent
Analysts/programmers	103
Electronic technicians	63
Drafters	73

And despite what one hears about mechanization, there continues to be a strong projected need for 64 percent more assemblers by 1987 (See attachments A and B).

Extrapolating projected needs by AEA survey respondents for electrical and computer engineers to the entire U.S. electronics industry and juxtaposing them against the projected supply of BS graduates from U.S. colleges and universities reveals a trend-shortfall of some 20,000 a year. Sixteen percent of these industry projections are based on successfully receiving defense contracts. However, even assuming no defense contracts, annual electrical and computer engineer graduate shortfall is projected annually to be over 16,000 (See Attachment C).

A second way high technology will contribute to job growth is that it will indirectly account for a significantly large proportion of new employment in service and related fields. In California, for example, state planners predict that because of this "multiplier effect," high tech employment will account for 40 percent of the total primary, secondary, and tertiary job growth in the state by the end of the decade.

Third, applied electronics will strengthen our traditional industries, helping maintain jobs and contributing to job growth and to absorption of displaced workers. The majority of jobs will come about through these "users" of high technology processes and products to increase productivity and innovation. Management expert Peter Drucker estimates that some 10 million manufacturing jobs today may be lost by 1990 due to outdated production processes and foreign competition. High tech will act as a partner with our traditional industries to help them remain competitive in historical markets, thereby preserving and expanding American jobs.

GROWTH IS DEPENDENT ON SUFFICIENT HUMAN CAPITAL

High technology's ability to fulfill its promise as a creator of new markets and job creation as a partner with traditional industries is predicated on the availability of sufficient numbers of skilled human capital—specifically on electrical and computer engineers and computer scientists and technicians.

The need for electrical and computer engineers, in spite of recent economic conditions, remains significant, as evidenced by unemployment figures. In 1981, unemployment for computer specialists and electrical engineers stood at a scant 1 percent, virtually full employment (See Attachment D). Yet, in spite of the enormous growth of the electronics and information technology industries over the last decade, the production of new electrical engineers with bachelor degrees has increased only 29 percent.

PRIVATE INDUSTRY WILLING TO HELP

The American Electronics Association has had an active national program to redress the shortage of technical personnel since 1981. Key elements of its efforts include:

A standard of 2 percent of each company's R&D to be given to engineering education.

Establishment of industry committees in states and regions to raise funds and work with state legislatures and universities to improve technical education budgets and programs. Those established to date are in: Washington, Oregon, San Francisco, Los Angeles, Santa Barbara, Orange County, Minnesota, San Diego, Texas, and Massachusetts. Additional ones are forming in New Jersey, New York, Connecticut, Arizona, Colorado, and Florida.

Establishment of an Electronics Education Foundation. Almost $3 million has been pledged to date to fund fellowship-loans, to augment faculty salaries, and to service and purchase equipment. Another $149 million has been stimulated directly from AEA members to universities.

Active involvement with federal and state legislation which addresses technical education issues, primarily through policies which encourage partnerships between industry, education, and government through tax incentives and other measures.

RELATIONSHIP OF R&D TO JOB GROWTH AND PRODUCTIVITY

R&D expenditures affect the creation of jobs and productivity growth. The R&D tax credit provided in the Economic Recovery Tax Act of 1981 (ERTA) has stimulated investment and constitutes what AEA companies regard as a major break-through in U.S. tax policy. It signaled the Federal Government's interest in encouraging increased private research (including university research).

While premature assessments may cause some to maintain that industry is not using the credit or that use does not warrant taxpayer costs, growing evidence shows that the R&D credit is a prime stimulus to increased investment.

Spokesmen for Digital Equipment Corporation maintain that their company's R&D expenditures have risen 38 percent in absolute dollars, up from 8 percent of revenues in 1981 to 11 percent in 1982. These increases have been motivated not only by strategic positioning but by the availability of the tax credit. Both Burroughs and 3M increased their R&D expenditures substantially and maintain that the tax credit was a primary incentive.

According to a recent survey of eighty-six AEA member companies, representative of other AEA membership in size, location, public ownership, and industry segment, a permanent R&D tax credit, similar to the four year program enacted in 1981 would increase annual R&D spending by AEA companies 20 percent to 25 percent. While initially only 24 percent of the companies surveyed changed their R&D budgets in response to enactment of the credit, at those companies which did change their plans, R&D spending increased an average of 63 percent (Attachment E). More significantly, the survey showed that fully 60 percent to 70 percent of the companies would utilize R&D tax credit provisions to increase R&D spending over the long term. That increased utilization will result from application to the development of computer software in 10 percent of cases, the earning of sufficient taxable income in 17 percent of the cases. The remaining 31 percent of companies responding that their R&D budgets would not be affected either do not generate sufficient taxable income or determine their R&D spending as part of a long-range technologically based plan (Attachment F).

R&D CREDIT NEEDS TO BE PERMANENT AND EXTENDED TO INSTRUCTION

We believe permanence of the ERTA R&D tax credit is essential if high technology is to remain competitive in both U.S. and world markets. AEA is strongly in support of H.R. 3031 and S. 738 to do this.

We believe the rationale which resulted in the R&D tax credit and an enhanced deduction for donation of research equipment to universities extends logically to include the following: donations by both manufacturers and customers of scientific equipment up to three years of age for use in instructional laboratories, appropriate warranties and service contracts, fellowship-loans to develop new science and engineering faculty, and for other educational needs previously described in this testimony. H.R. 3098 as well as H.R. 3095 (Shannon and Archer), and S. 1095 (Bentsen and Chafee) and S. 1094 (Danforth) are based on extending this R&D tax credit and deduction.

ROLE OF THE FEDERAL GOVERNMENT

We believe the federal government cannot force technological leadership. It can, however, foster it through a strong national commitment to basic research and the creation of an educational system which provides for the education and training of sufficient numbers of engineering and scientific human capital and so that young people may live and work effectively in this "Information Age."

We are pleased to have the opportunity to express our support for H.R. 701 with additions contained in H.R. 3098. These bills constitute examples of cornerstone legislation that will help restore this country's technological and economic leadership. We commend Congressman Stark for his leadership in introducing this legislation

American Electronics Association

ATTACHMENT A

JOB GROWTH PROJECTIONS

PROFESSIONAL

UNITED STATES*

	ACTUAL 1982	PROJECTED INCREASE 1987	% OF GROWTH***
ELECTRICAL/ELECTRONIC ENGINEER	52,261	32,172	65.5%
SOFTWARE ENGINEER	21,806	23,379	115.0%
MECHANICAL ENGINEER	12,694	6,890	58.8%
COMPUTER ANALYST/ PROGRAMMER	10,567	10,068	102.5%
ELECTRONIC ENGINEERING TECHNOLOGIST	7,607	7,454	107.0%
TOTAL PROFESSIONALS**	167,434	109,449	69.1%

* 815 FACILITIES REPORTING

** INCLUDES CATEGORIES NOT LISTED ABOVE

*** CALCULATIONS BASED ON RESPONDENTS WHO PROJECTED FOR ALL 5 YEARS

American Electronics Association

ATTACHMENT B

JOB GROWTH PROJECTIONS

PARAPROFESSIONAL

UNITED STATES*

	ACTUAL 1982	PROJECTED INCREASE 1987	% OF GROWTH***
ELECTRONIC TECH	44,368	25,981	63.1%
ASSEMBLY	110,892	65,242	63.7%
DRAFTING	8,950	5,975	73.3%
TOTAL PARAPROFESSIONALS**	203,447	115,154	60.1%

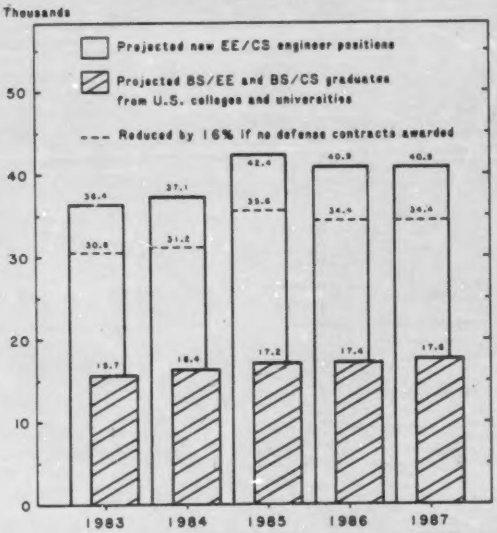
* 815 FACILITIES REPORTING

** INCLUDES CATEGORIES NOT LISTED ABOVE

*** CALCULATIONS BASED ON RESPONDENTS WHO PROJECTED FOR ALL 5 YEARS

ATTACHMENT C

EE/CS Engineer Supply and Demand



1983–1987

PROJECTED NEED FOR EE/CS ENGINEERS	197,662
PROJECTED NEW EE/CS GRADS	84,256
PROJECTED SHORTFALL	113,406
PROJECTED SHORTFALL (w/o defense)	81,780

METHODOLOGY TO COMPUTE DEMAND

1) EE figures are based on projected annual growth rate of 10.6% from 1983–87. CS figures are based on projected annual growth of 16.5%. Data comes from 815 electronics facilities with combined annual sales of $56B. Based on these sales figures, AEA data reflects about 30% of the entire industry. Projections, therefore, are presented for the entire industry.

2) 16% of the industry projections are based on successful awarding of defense contracts. Therefore, demand projections have also been reduced by 16% based on a conservative scenario that no anticipated defense contracts will be awarded.

METHODOLOGY TO COMPUTE SUPPLY

1) Projections of BS/EE degrees are based on National Center for Education Statistics, which reports 2.4% annual growth through 1985, and 2.5% decrease annually from 1985–90.

2) Projections of BS/CS degrees are based on annual growth of 15.8% (average annual increase of degrees awarded from 1977–82). Degree projections assume, therefore, that U.S. colleges will continue to increase the number of BS/CS degrees awarded at the same rate as the past 5 years.

3) Projections reflect 80.2% of entire BS/EE and BS/CS grads, since NSF estimates that 80.2% of all engineers in the U.S. are employed in industry.

ATTACHMENT D

UNEMPLOYMENT RATES OF THE SCIENCE AND ENGINEERING LABOR FORCE: 1972—1981

	1972	1973	1974	1976	1978	1980	1981
TOTAL ALL FIELDS	1.9	0.9	1.7	3.0	1.4	1.1	1.1
ENGINEERS	2.2	0.9	1.3	2.1	1.3	1.0	1.0
ASTRO/AERO					0.6	1.1	1.0
CHEMICAL					1.1	1.1	1.1
CIVIL					3.2	1.2	1.0
ELECTRICAL/ELECTRO					0.5	1.0	1.0
MECHANICAL					0.6	1.0	1.0
OTHER					1.3	1.0	1.0
PHYSICAL SCIENTISTS	1.8	0.7	2.5	4.2	2.0	1.7	1.6
COMPUTER SPECIALISTS	1.4	0.5	1.0	0.6	0.3	1.0	1.0

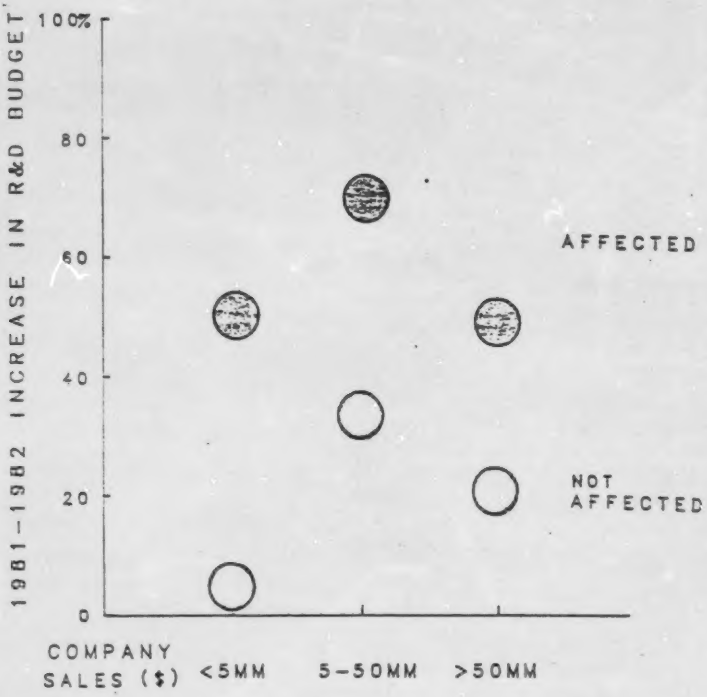
SOURCE: NATIONAL SCIENCE FOUNDATION AND
BUREAU OF LABOR STATISTICS.

SRS 82-1680
7-28-82

ATTACHMENT E

R&D TAX CREDIT IMPACT

1981-82 INCREASE IN R&D BUDGET*

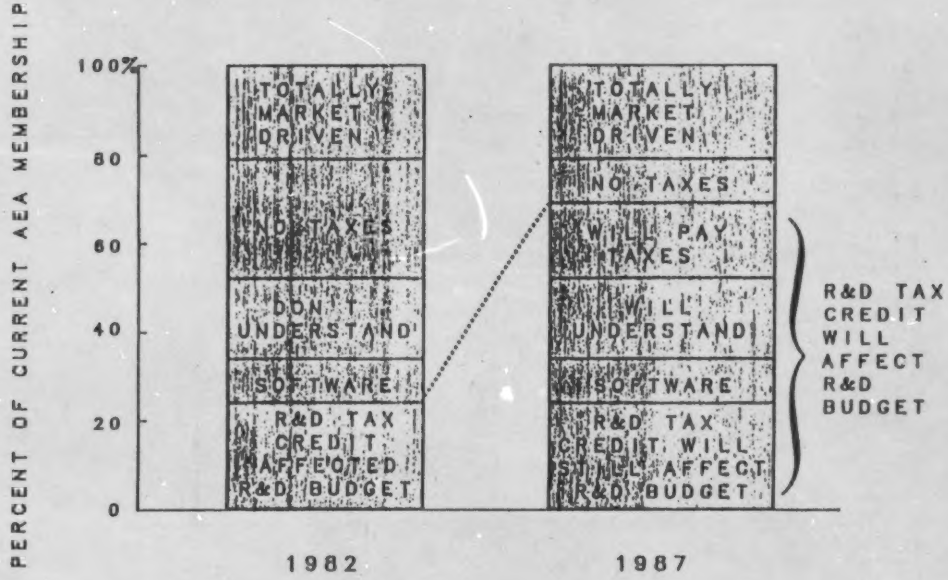


*Tax Paying Companies

R&D TAX CREDIT

POTENTIAL EFFECT OF EXTENSION & EDUCATION

(1982–1987)



ATTACHMENT F

Chairman **Stark**. Thanks very much, Dave. A couple of things that occur to me is that I suspect that if you stretch the 1 year to 5 years, that the necessity of the 30 percent may diminish, but there is always in some of these programs the danger that they will become permanent and then the incentive to build a base of computer equipment quickly diminishes. I think that was the intention in trying to balance off how we could encourage people to make those extra donations early on and kind of fill the pipeline, as it were.

Second, I am troubled in requiring donations in that I don't know as we have ever done that in any other kind of tax measures. I have no problem in giving an incentive for donations, but to say if you donate a dollar, you have got to donate the 20-cent stamp to get it there. I think that we could make donations of the other types of peripherals of the programing and the training eligible, but I am not sure that we could say to a manufacturer of the black box, you have also got to donate a program and, in fact, you might have to go out and acquire it to make—and pay something for it—to make his donation of the equipment possible, so that while I have no quarrel with making sure that you don't give a one-legged chicken, you only make that as a perspective or encouragement, and not as a requirement.

I also would ask you and the members of your association—we have asked this and many of them have been very cooperative—the one problem that we are facing and one of the reasons this bill was dropped in the Senate, is the budget pressures that we are under. It does cost the taxpayers something. There is no free lunch, and to the extent that we can have more examples as we had this morning, or to the extent that through the research and development credit extension we can show actual employment increases and figures, it makes our job in justifying the expenditure of taxpayers' money easier and also might make it easier to sell to our colleagues.

There is always the suspicion that we are just giving something away to certain manufacturers and we are not really getting the quid for the pro quo, and so that your association could continue to help us by providing actual statistics to where our taxpayers' dollars are helping.

I want to thank you very much for taking the time to be with us this morning. We appreciate your support. Thank you.

Mr. **Bossen**. Thank you.

Chairman **Stark**. We will now squeeze a panel in up here of Barbara Bowen, who is director of the Apple Education Foundation; Emery Rogers, who is executive director of Hewlett-Packard Foundation, the National Grants Review Board; Mr. Gary Gubitz, the corporate training specialist for Hewlett-Packard; Lillian Heller, the director of Kaypro's for Kids, the Kaypro Corp.; and Mike Rashkin, who is counsel, tax counsel, at the Apple Corp.

Many of you have worked with us in the past on this legislation and testified before and many of you have been very actually quite active in formulating the legislation. I appreciate that. I look forward to hearing the results of the California experience this morning.

Who is going to lead off? Barbara Bowen, you are the first on the list; why don't you start.

STATEMENT OF BARBARA BOWEN, DIRECTOR, APPLE EDUCATION FOUNDATION, ACCOMPANIED BY MICHAEL D. RASHKIN, DIRECTOR OF TAXES, APPLE COMPUTER, INC.

Dr. Bowen. Thank you, Mr. Chairman. I am very pleased to be here this morning to have the opportunity to appear before you and testify in support of H.R. 701. As you mentioned, Mike Rashkin, who is director of taxes at Apple, is here with me to answer any technical questions on taxes that might arise.

I direct the Apple Education Foundation. The education foundation was formed by Apple in 1979 with the charter of supporting projects that created new ways to teach and learn using microcomputers. As Joan Targ mentioned in her testimony, we realize that microcomputers offer a really unique kind of new learning tool and that supportive projects which really explore its possibilities are very important.

In the 3½ to 4 years since its beginning, the foundation has supported 170 educational projects to develop model software and has also participated with the National Science Foundation in the support of National Science Foundation projects.

We have also collaborated with the Ford Foundation, the Exxon Education Foundation and Research Corp. to support educational research and development projects and research in the natural and physical sciences. So it is really in this context of Apple's corporate support for education that the "Kids Can't Wait" program, which I will discuss in more detail, took place.

As you know, Mr. Chairman, by the end of November, Apple will have completed the donation of approximately 9,100 computer systems, software, and teacher-support materials to the public and private elementary and secondary schools in the State of California.

This was done under the auspices of California legislation, officially known as A.B. 3194, popularly known as the "Kids Can't Wait" bill, and this legislation was modeled on the legislation which you introduced in the previous Congress, H.R. 5573.

I would like to provide you with a time line and sequence of events as they emerged as we donated equipment into the schools, how things really went. The bill was passed in September of 1982 and was to be effective from January 1, 1983, to June 30, 1984, for those 18 months.

It established a tax credit, as has been mentioned, of 25 percent of fair market value for donation of computer equipment to the elementary and secondary schools in California, both public and private institutions. The ground rules were as follows: That public elementary and secondary schools and tax-exempt private schools were eligible; that the computers must be used directly for instruction—in the education of students in the State of California; that the property could not be transferred by the donee for money or services or other equipment; the taxpayer would receive a written statement by the donee that, in fact, the uses of the equipment were in keeping with the provisions of the bill; and that the donor must donate equipment not more than 1 year after its manufacture.

There were no minimum nor maximum levels placed on donations of equipment by manufacturers, either in terms of percent of pretax profit nor the numbers of systems to be donated to schools.

Further, the legislation did not require that concomitant donations of software be provided, nor that training be provided by the donor. In December of 1982, following this time line, Apple hired Mr. Stephen Scheier to manage the "Kids Can't Wait" donation program. As I am sure you are aware, Mr. Chairman, Apple does not have its own distributors. Its distributors are dealers who are independent business people so that one of the first orders of business was to persuade these independent business people to participate in the distribution of systems under the auspices of this program.

To make a long story short, 144 dealers in California, out of a possible 175, agreed to participate. Even though not required by legislation, Apple required these dealers to provide orientation and training to school personnel as a prerequisite for receiving an equipment donation.

In May, we sent applications to all the eligible schools, both public and private, inviting them to participate. Some 9,450 eligible schools were identified, using a data base of schools in the State that was provided by the State of California.

This included all public elementary and secondary schools, tax-exempt private schools with a student enrollment of over 100 students, special schools run by the county offices of education and regional occupation centers. All of these institutions were eligible for a donation.

In July, Apple began mailing applications to schools. On the 4th of July, dealers began their orientation and training sessions and at least one person from each school was trained. The applications were accepted until the end of September, September 30, although the bulk of these were received in July and August of this year.

Once applications had been validated, certificates were sent to the schools. These were taken to the dealer sites, the dealer signed them when the school personnel received training, and then these signed certificates were sent to one of the two regional support centers that Apple operates in California. It was these support centers who actually shipped the equipment upon receipt of the validated certificate.

What they shipped was known as the "Kids Can't Wait" package, and this package consisted of an Apple IIe microcomputer, a disk drive, a monitor, Apple logo software, a copy of the 1983-84 Sterling-Swift Directory of Educational Software, Applesoft basic programing manuals, software discount coupons, and materials written by the International Council on Computers in Education that gave information to teachers on classroom uses of computers.

Shipments began during the last week of July and will continue until November 18. Upon completion of the program, it will have taken 11 months and delivered 9,051 of these packages into the schools in California.

In addition to the donations to the schools, Apple donated five computer systems to each of the 15 Teacher Education Computer

Centers [TECC], that former Governor Brown mentioned in his testimony today, to assist in their provision of teacher training with respect to the educational uses of microcomputers. The total fair market value of the donated equipment is $20 million, the cost to Federal and State taxpayers has been $4 million, and the cost to Apple Computer, Inc. has been $1 million.

The California program contained no limitations on systems donated and yet there have been no abuses. Apple has not dumped obsolete inventory; it has not discriminated in the schools to which the equipment was donated; it has provided for training and has provided software and other support materials for teachers.

The bill has been in effect for 11 months now and we know of no computer manufacturers in the State who participated who have abused the bill.

We have gotten many, many, very positive responses from school districts from both teachers and children who have received the computers and I would like to share some representative examples with you. I will just quote briefly from some of the letters which we have received.

From St. Michael's High School in Los Angeles:

> Our students are all minority students. They come from families which, in the vast majority of cases, would be unable to purchase a computer for home use. So whatever we can offer at school is their main introduction to and exposure to computer science.

From Sun Valley, Calif.:

> I am writing on behalf of my kindergarten and first grade children who are overwhelmed with your generous gift to our school. We are learning letter matching on the computer and it is thrilling. Enclosed please find the hugs and kisses of 32 grateful children from the Vinedale School.

From Los Angeles, Calif.:

> If Apple computer did not initiate the "Kids Can't Wait" program, St. Thomas School would never have obtained a computer. Though it is only one, it is a marvelous start. Thank you very much for including our school in your program.

From a student at St. Thomas More School:

> The Apple computer you sent has made math an easier subject for me and has helped me to get things that I couldn't understand before. This computer has made my school year more fun. Thanks a lot.

From a teacher in Pleasanton, Calif.:

> Alisal School couldn't wait, nor did we have the funds to purchase a computer. I just want to let you know that we now have received our free Apple IIe through your "Kids Can't Wait" program, and boy, are we excited. The computer runs well and the LOGO program is terrific for our kids.

And finally:

> The enclosed letter was dictated and signed by the handicapped students in my class. Our school for the severely handicapped received your gift of a computer just in time for school to begin. The whole class is very excited. The students in my class have really taken to the computer. On behalf of the whole school, I want to thank you very, very much for your generous gift. It seemed unlikely that our school would have been able to buy a computer. Without your gift, our students most probably would never have had the opportunity to use one.

Mr. Chairman, Apple continues to strongly support H.R. 701, the Computer Contribution Act of 1983, which you have introduced into the U.S. House of Representatives. Based on our experience of donating over 9,000 computers in California, there are a few recommendations which we have which we think would improve the bill at the Federal level.

First, we recommend elimination of the assembly requirement for peripherals.

Second, we recommend an alternative to the 10 percent of pretax profits limit on the value of donated equipment.

Third, we recommend delaying the bill for 1 year.

In summary, Apple Computer has made a good-faith effort as demonstrated by the California "Kids Can't Wait" program. This has been done under the auspices of a bill which did not place undue restrictions on our capacity to respond. The results have really been heartening.

Mr. Chairman, you have been at the forefront in attempting to get the U.S. Government to provide legislation at the Federal level which would permit all schools in the country to benefit in the way that the California schools have benefited. Apple will continue to back your efforts to provide access for the school systems in the United States to the most current technology.

We strongly support your efforts to prevent undue restrictions in H.R. 701, which would make it impossible for Apple and other companies like us to fully participate to the benefit of the schools in this country.

[The prepared statement follows:]

STATEMENT OF BARBARA L. BOWEN, PH. D., DIRECTOR, APPLE EDUCATION FOUNDATION, APPLE COMPUTER, INC.

Mr. Chairman, I'm pleased to be here today and to have the opportunity to appear before your Subcommittee and testify in support of H.R. 701.

I am the Director of the Apple Education Foundation. The Education Foundation is one of two philantropic corporate donations departments of Apple Computer, Inc. Recognizing that microcomputers can be unique and powerful tools for enhancing learning, Apple established the Foundation in 1979 with the charter of supporting projects which used microcomputers to create new ways to teach and learn. Since then, the Foundation has made 170 grants to educators to develop model educational software, and has supported 19 projects in collaboration with the National Science Foundation, and collaborated with the Ford Foundation, the Exxon Education Foundation, and Research Corporation to support research and development projects in education and the natural and physical sciences. The donations of microcomputers for the "Kids Can't Wait" Program took place in this context of corporate support of education.

As you know, Mr. Chairman, by the end of November, Apple will have completed the donation of approximately 9100 computer systems, software, and teacher support materials to the public and private elementary and secondary schools in California under the auspices of California legislation. The program is known as "Kids Can't Wait" and was inspired by H.R. 5573, the bill which you introduced in the previous Congress.

There are several areas I will touch upon in my testimony which reflect our experience in donating these computer and the experience of the schools in receiving them.

THE SEQUENCE OF EVENTS

First, the history and timeline of events. A.B. 3194 was passed in September, 1982, to be effective January 1, 1983 until June 30, 1984. This bill established a tax credit of 25 percent of fair market value of computer equipment donated by manufacturers to elementary and secondary schools in the State of California. The groundrules of this legislation are as follows. Public elementary and secondary schools and tax exempt private schools are eligible for donations under this legislation. All of the use of the equipment by the donee is to be directly in the education of students in the state of California. The property can not be transferred by the donee for money, property or other services. Taxpayer receives from donee a written statement that its use will be in accordance with these provisions. The donor must donate the equipment less than one year after manufacturer. A.B. 3194 placed no minimum nor maximum donations on manufacturers, in terms of percent of pretax profit which could be spent on the donations, nor on the number of computers which could be donated to schools. Further, the legislation required neither concomitant software donations not provision of training by the donor.

In December, 1982, Apple hired Mr. Stephen Scheier to manage the Kids Can't Wait donation program.

As I'm sure you are aware, Mr. Chairman, Apple does not have its own distributors. Its distributors are dealers who are independent businessmen. Therefore, one of the first things we had to do was to persuade the dealers to participate in this program. To make a long story short 144, dealers out of a possible 175 participated in this program. Even though it was not required by the legislation, Apple required its dealers to provide orientation and training to school personnel. The dealers also handled all the paperwork of getting the systems out.

In May, we sent application to all public school districts and a large number of private schools, inviting them to participate. Some 9,450 eligible schools were identified from a database supplied by the State of California. This included all public elementary and secondary schools, tax-exempt private schools with student enrollment over 100, special schools run country offices of education, and regional occupational centers.

In July, Apply began mailing applications to schools. On July 4, dealers began their orientation/training sessions with school personnel. At least one person from each recipient school participated. Applications were accepted until the end of September, although the bulk were returned in July and August. Certificates were mailed to eligible schools after validating their returned applications against the database. The dealers signed these certificates at the time of training, and then sent them to the appropriate regional support center. Upon receipt of the certificate, the support center began the process of shipping a Kids Can't Wait package to the designated school. The package consisted of: an Apple IIe microcomputer, disk drive and monitor, Apple Logo software, a copy of the 1983-1984 Sterling-Swift educational Software Directory, Applesoft Basic Programmers Reference Manuals, software discount coupons from major publishers, and brochures on uses of computers in schools published by the International Council for Computers in Education. Shipments began during the last week of July and will continue through Novembver 18. During the heaviest shipping periods in August, and in early September, each support center shipped 400 Kids Can't Wait packages per week. Upon completion, the program will have taken 11 months, December, 1982 to November, 1983, to carry out.

Latest figures indicate that Apple will have donated 9,051 Apple IIe microcomputer systems and accompanying materials by November 18, 1983. In addition, 5 Apple IIe systems were donated to each of the 15 Teacher Education/Computer Centers (TECC) in California to assist in providing training for teachers in educational uses of microcomputers. The total fair market value of the donated equipment is $20 million. The cost to Federal and State taxpayers has been $4 million, and the cost to Apple Computer, Inc. has been $1 million.

The California program contained no limitations on systems donated, yet there have been no abuses. Apple has not dumped obsolete inventory, has not discriminated, has provided for training, and has provided software and other support materials. The bill has been in effect for 11 months and we know of no computer manufacturers who have abused it.

RESPONSE FROM DONEES

Many very positive responses have been received from school districts who received the donated Apples. I'd like to share some representative examples with you, Mr. Chairman.

"Our students are all minority students . . . They come from families which—in the vast majority of cases—would be unable to purchase a computer for home use. So whatever, we can offer at school is their main introduction to and exposure to computer science." St. Michael's High School, Los Angeles, CA

"I am writing on behalf of my kindergarten and first grade children who are overwhelmed with your generous gift to our school. We are learning letter matching on the computer and it is thrilling. Enclosed please find the hugs and kisses of 32 grateful children from the Vinedale School." Sun Valley, CA

"If Apple computer did not initiate the Kids Can't Wait Program, St. Thomas School would never have obtained a computer. Though it is only one, it is a marvelous start. Thank you very much for including our school in your program." Sister Anna Marie Law, Los Angeles, CA

"The Apple computer you sent has made math an easier subject for me . . . and has helped me to get" things I couldn't understand. This computer has made my school year more fun. Thank you for being so generous." Danni Conti, (student) St. Thomas More School.

"Alisal school couldn't wait, nor did we have any special funds to purchase computers. I just want to let you know that we now have received our free Apple //e computer through your "Kids Can't Wait" program and boy are we excited. The computer runs well and the LOGO program is terrific for our kids." Bob Kroetch, Alisal Elementary School, Pleasanton, CA

"The enclosed letter was dictated and signed by the handicapped students in my class. Our school for the severely handicapped received your gift of a computer just in time for school to begin. The whole class is very exicted. The students in my class have really taken to the computer . . . On behalf of the whole school, I want to thank you very, very much for your generous gift. It seemed unlikely that our school would have been able to buy a computer. Without your gift, our students most probably would never have had the opportunity to use one." Tina Tillotson, Wintun School, Napa, CA

"Those students who have begun to work on the machine have been very impressed with the Apple LOGO language. The teachers who have begun to investigate what they might be able to do with the computer have been very impressed with the enormous amount of software that is available." David Griffith, Christian Bros. High School, Sacramento, CA

RECOMMENDATIONS FOR H.R. 701

Mr. Chairman, Apple continues to strongly support H.R. 701, The Computer Contribution Act of 1983, which you have introduced in the U.S. House of Representatives. Based on our experience of donating over 9,000 computers to the elementary and secondary schools in California, we have a few recommendations which we think would improve your bill.

First, we recommend elimination of the assembly requirement for peripherals. Although H.R. 701 does not include the very tough manufacturing requirement contained in Section 170(e)(4), it nevertheless contains an assembly requirement. This requirement produces a problem because personal computer manufacturers generally do not make the peripherals that are sold with the computer. For example, Apple does not make monitors, and does not plan to continue making disk drives. These items are and will be purchased by Apple.

Consequently, we recommend paragraph (B)(iii) to read as follows: "the property described in paragraph (D)(i) is assembled by the taxpayer and the taxpayer is regularly engaged in the business of assembling and selling computer equipment as of the same kind as such property."

We foresee no abuse that can result from eliminating the assembly requirement for peripherals and installation equipment.

Second, we recommend an alternative to the 10 percent of pretax profits limit on the value of donated equipment. The 10 percent limit will put a real damper on the effectiveness of this bill. Other alternatives seem possible. Perhaps a limit on the amount of data processors per school or on the total amount of data processors per company would be a better limit. Otherwise companies who have uncertainty over the amount of their taxable income will be unlikely to participate very enthusiastically in a contribution program.

Third, we recommend delaying the bill for one year. Our experience in California has shown that it took about six months to get things rolling and another five for the distribution of equipment. It seems unlikely that a national program could be accomplished in 1984. We recommend the effective date be moved forward to 1985.

COMMON ALLEGATIONS

Mr. Chairman, there have been a number of allegations made and questions raised about this bill. These allegations and questions represent a misunderstanding of what H.R. 701 is really all about and what its impact will be. I will address only two of the most common issues raised.

WHY SHOULD COMPUTERS BE SINGLED OUT FOR SPECIAL TREATMENT?

As one educator has stated, you cannot teach computer science or computer literacy without a computer. Although all areas of education are suffering because of financial problems, without computers a school cannot even begin to deal with a technology that may become the foundation of the economy in the near future. The result is that if a student is fortunate enough to attend a school where there is access to computers, then he or she will be better prepared for employment and education opportunities than those who have not had computer training.

Schools throughout the United States have recognized the need for computers and many schools have computer programs. However, schools in affluent areas are more likely to have the funds to acquire computers than schools in nonaffluent areas. In an article in The Wall Street Journal of Thursday, May 26, 1983, entitled, "Computers May Widen Gap In School Quality Between Rich and Poor," Andrew Molnar of the National Science Foundation is quoted as follows, "The advantage of the American school system is that it's decentralized. Schools that want to introduce computers are free to do so; the disadvantage is there are going to be major discrepancies between those who have the resources and those who don't."

S. 1194 and 1195 contain a provision that requires that the donation of computers to K-11 schools be in accordance with a plan that does not discriminate on an economic or geographic basis. Any manufacturer deciding to donate computers under these bills would be helping to alleviate the disparity between those who have access to computers and those who otherwise would not.

In sum, computers are different because: (1) computer science or literacy cannot be taught without computers, and (2) the lack of access to computers will handicap those groups without the resources to acquire access.

TAXPAYERS WILL BEAR VIRTUALLY THE ENTIRE COST OF FUNDING THIS PROGRAM

The example given in your statement of May 27, 1983 shows a cost of $1,000, and a fair market value of $3,000. These facts would produce a deduction of $2,000 under S. 1194 and 1195, giving rise to the conclusion that taxpayers would bear virtually the ultimate burden of funding this program.

This example shows the manufacturer to have a gross margin of approximately 67 percent. An article in the June 13, 1983 issue of Fortune, entitled, "Meet the New Lean, Mean IBM," reports that IBM's anticipated gross margin (selling price less manufacturing costs) is 55 percent with respect to personal computers. Apple's reported gross margin for 1982 is 50.6 percent.

The 67 percent margin used in your example may be accurate for some products if one considers inventoriable costs only. However, there are many costs which are included in cost of goods sold, but not included in a fully absorbed inventoriable cost of manufacturing a product. These include distribution costs, warranty costs, and inventory write-offs.

Accordingly, it may be possible for manufacturers to have a 67 percent gross margin and a 92 percent cost recovery when considering inventoriable costs only; but manufacturers would not receive any special treatment with regard to noninventoriable costs or with regard to the administrative costs of implementing a donation program. In addition, taxpayers would incur financing costs since they would not receive an instant tax benefit when they contribute a computer to a school. There is a time lag between the time a taxpayer can actually use the tax benefit as a reduction of estimated taxes or as a reduction of taxes shown on the tax return, and this loss of use of funds can represent a substantial cost.

Moreover, manufacturers do not usually manufacture each item of equipment that make up a complete computer system and may not receive a benefit under S. 1194 and 1195 do not apply to items not assembled by the donor. However, we do not believe there should be an assembly requirement for peripherals which are provided with a computer.

What then will be the cost recovery under S. 1194 and 1195 of a computer manufacturer that provides computer systems to K-12 schools? Considering the factors discussed above, the costs recovered would clearly be less than the 92 percent postulated in your Senate statement. We would like to be able to show by line item detail what Apple's cost recovery would be, but this information represents confidential trade information which we hesitate to disclose. However, our estimations show that as a result of noninventoriable costs (warranty and distribution), nonqualified peripherals, administrative costs and financing costs, the cost recovery to the company would be somewhere in the 70-80 percent range.

Under current law, a company can give away equipment and receive a cost recovery of 46 percent. S. 1194 and 1195 would probably increase that recovery by 24 to 34 percentage points. In effect the government would be buying needed equipment at approximately 75 percent of cost. We believe this is a very beneficial arrangement, especially considering the alternatives: substantially less contributions, with the nonaffluent areas being the most adversely affected; or government funding of a program which will result in the same computers being sold to the government at normal prices, resulting in much higher acquisition and administration costs.

SUMMARY

Apple Computer, Inc., has made a good faith effort as demonstrated by the California "Kids Can't Wait" Program. This has been done under the auspices of a bill which did not place undue restrictions on our capacity to respond. The results have been heartening. Mr. Chairman, you have been at the forefront in attempting to get the United states government to provide legislation at the Federal level which would bring to every school in the United States the benefits which have been brought to those in California. Apple will continue to back your efforts to provide access for the school systems of the United States to the most current technology. We strongly support your efforts to prevent undue restrictions in H.R. 701 which would make it impossible for Apple, and other companies like us, to fully participate to benefit the schools of our country.

APPENDIX A

THE APPLE EDUCATION FOUNDATION

The Apple Education Foundation was established in 1979 to support the development of new methods of teaching and learning through the use of small computers. The primary goal of the Foundation is to improve the results of the educational process. Resources are alloted to projects aimed at creating innovative methods of teaching and learning through microcomputer technology. Grant authorizations consist primarily of microcomputer hardware and accessories.

Equipment grants totaling over a million dollars have been awarded by the Foundation to more than 170 projects for the proposed development of quality, instructional courseware. The supported projects hold the promise of innovative courseware design in a broad spectrum of instructional disciplines, from pre-school through post-graduate education, museums, libraries, health services, special education and teacher training. Courseware resulting from these grant projects will be made available through commercial publishers and will serve as models of excellence in curriculum design and application.

In addition to our direct grant programs, the Apple Education Foundation, in collaboration with National Science Foundation, awarded over $250,000 worth of equipment in 1982 to the NSF program: "Pre-College Mathematics Education Using Computers." Donations of microcomputer equipment have also been made in collaboration with several other Foundations including Exxon Foundation, Ford Foundation, and Research Corporation.

For your information the primary objectives of the 1983 "Teacher's Can't Wait" guidelines are:

To support school/university collaborative projects which will provide excellent examples of educational applications of microcomputer technology.

To create active learning environments and improve the quality of students' learning in mathematics, science, language, social studies, and other curriculum areas.

To improve problem solving and information processing skills.

To support the development of training programs which will improve teachers' ability to use microcomputers appropriately to enhance students' learning.

The Apple Education Foundation is a division of Apple Computer, Inc. with leading members of the educational community serving on the Foundation's Board of Advisors. This eminent Board of Advisors provides advice and counsel, assuring impartial judgment and diversity of awards throughout the United States. Apple Computer believes in strengthening the nation's educational system. It views the Foundation as one means of demonstrating its commitment to education.

APPENDIX B

KIDS CAN'T WAIT

FACT SHEET

Donation Package

Apple IIe Computer.
Monitor.

Disk Drive.
Apple Logo Software.
1983-84 Sterling-Swift Educational Software Directory.
Applesoft Basic Programmers Reference Manuals.
Software discount coupons from major publishers.
Brochures on computer useage in schools published by the International Council for Computers in Education.

Warranty

Standard 90-day service warranty on all components.
"AppleCare" Carry-In Service Plan available.

Eligible schools

Public K-12 schools.
Tax exempt private schools with enrollments of over 100 K-12 students.
State-certificated private tax-exempt special education schools.
Selected schools operated by County Offices of Education.

Schedule

May 11: Kids Can't Wait Program announced. Information mailed to school district superintendents, County Superintendents and private school administrators. Letters are also mailed to 9,000 Apple designated schools.

May 12-June 10: Administrative officers send Apple a list of schools they approve to receive a computer system.

June 20: Apple mails orientation certificate to each eligible school.

June 22-Sept. 30: An individual from each school redeems a certificate at an Apple dealer and attends orientation session. Apple ships computer systems to school.

Sept. 30: Completion of Kids Can't Wait Program.

Product will be shipped within 30 days of certificate redemption.

Chairman **Stark**. Thank you very much. We will now have the dynamic duo of Emery Rogers and Gary Gubitz presenting a joint statement. I am going to let you all decide how you are going to do that jointly. We have your prepared statement and proceed in whichever fashion you are comfortable.

STATEMENT OF EMERY H. ROGERS, EXECUTIVE DIRECTOR, HEWLETT-PACKARD FOUNDATION, NATIONAL GRANTS REVIEW BOARD

Mr. **Rogers**. Thank you, Pete.

My name is Emery Rogers and I am responsible for orchestrating Hewlett-Packard's worldwide spectrum of philanthropic programs. Most of these programs are concentrated right here in the United States, where direct private giving is not only a strongly encouraged way of life, but is also one of the reasons for America's leadership in critically important technological fields. It is not insignificant that the first two great clusters of high-tech industry—Route 128 in Massachusetts and Silicon Valley here in California—sprang up around private universities where direct private-sector academia relationships were necessarily long in place. Survival required that.

Regrettably, that historic American science leadership is eroding and our purpose today is to discuss creative ways in which that crucial leadership can be retained and enhanced for the well-being of our Nation and its citizenry. I don't need to tell you what happens if a country loses its technological sophistication.

Hewlett-Packard, with headquarters 30 miles south of here in Palo Alto, develops and manufactures a wide array of instruments, computers, analytical, and medical products. Our substantial philanthropic programs must be financed from the success of those products. We believe it is our pleasant duty as citizens to share a portion of the profits with the local and national communities within which we have the privilege of functioning. Because we happen to have thousands of different technical products which in themselves can serve mankind beneficially, we decided a number of years ago to devote the lion's share of our philanthropic efforts to direct granting of Hewlett-Packard equipment. These advanced devices end up in schools, universities, hospitals, social service agencies, arts organizations, among other recipient categories.

In 1981, total HP giving amounted to $10 million. In 1982, this figure was increased to $15 million, and this year our giving doubled to $30 million. We currently foresee another substantial increase in the new year just ahead. More than 80 percent of our contributions are in the form of new equipment grants, the remainder is in cash. The very substantial amount of volunteered employee time and talent associated with this giving is not charged to philanthropy at Hewlett-Packard. We wouldn't know how to begin to keep so many portable timeclocks.

Why has this major expansion of philanthropy occurred at a time when recession has been a sad fact of life in many industries? It is certainly true that Hewlett-Packard is in the middle of the high-technology thrust. We did not suffer the severe dislocations experienced by other more traditional industrial segments. Given that favorable fact, let me suggest three principal reasons why our company determined to expand its philanthropy so greatly during the past 4 years:

First, Hewlett-Packard, by virtue of its company mission and employee skills, is unusually well suited to join with other like-minded companies in contributing to the solution of America's growing technological literacy problem. As a complementary variation on this central theme, it is now well recognized that rising above deprived human conditions is greatly aided by acquisition of science, engineering, and medical skills on the part of individuals caught by birth in those conditions. Our grants can help the escape process, while the talent pool is being simultaneously enlarged for the national benefit.

Congressman, let me make the side comment here that I have recently visited South Africa, where I became convinced that the idea you are supporting for the United States would work in Soweto, too. Here is a country, South Africa, that is technologically advanced. Here are potentially talented people living in that southwest township. There is a teachers college in the middle of Soweto. Why don't we get that idea going there, too?

Second, among our three reasons why we expanded our philanthropy so greatly, we now have in place a large network of volunteer employees who are absolutely mandatory for successful implementation of our numerous complex technical equipment grants programs. This multiplication of heads and hands is crucial to the—grant request—preparation, decision, assembly, delivery, maintenance, and technical liaison procedures involved in this specialized form of philanthropy. You can't function without that.

Third, recent tax legislation providing enhanced deductions or tax credits for making certain equipment grants has reduced somewhat the cost of contributing these devices per se to qualified recipients. HP has elected to utilize these savings in helping expand its philanthropic programs, rather than in increasing any direct monetary return to its stockholders.

Before I yield the floor to my colleague, Mr. Gary Gubitz, who will provide you with a few details pertaining to a classic manifestation of these three central factors in HP philanthropy, one last point should be made here.

We at Hewlett-Packard have developed, by company cultural inclination, and by grants-style necessity—as mentioned above—a widespread employee networking approach to corporate philanthropy, as opposed to the more typical oligarchical one. We want our employees to enjoy serving as volunteers and we need them to provide us with the wide-ranging expertise which can only be found in team endeavors. We ask them to share in the wide-ranging grants decisions procedures.

The eventual results are generally far more effective for grant recipients. On the other hand, much higher hidden cost is inherent in this networking approach. When these thousands of employees are volunteering their time to achieve truly worthwhile community and national goals, they are not performing their regularly assigned research, development, marketing, manufacturing, financial, personnel, or administrative duties. Tax reductions focused on the cost of the equipment itself can only barely begin to take into account this vast unrecorded human cost which is part and parcel of dynamic continually interactive equipment grants programs. Cash giving is simpler, less involved, and somewhat remote by comparison. We have deliberately chosen this high-cost equipment-granting path for most of our philanthropy precisely because it increases employee voluntarism at Hewlett-Packard, while it simultaneously attacks a serious national problem affecting all of us. Remoteness is out, involvement is in at Hewlett-Packard and furthermore, philanthropy, which costs the giver little, is hardly worthy of the name.

Now, let me introduce Gary Gubitz, who himself is a textbook example of what we like to see in HP voluntarism.

Thank you.

Chairman STARK. Gary, proceed.

STATEMENT OF GARY L. GUBITZ, CORPORATE TRAINING SPECIALIST, HEWLETT-PACKARD CO.

Mr. GUBITZ. On behalf of all the members here, Mr. Chairman, I would like to wish you a happy birthday.

Chairman STARK. Thank you very much.

Mr. GUBITZ. My name is Gary Gubitz and I am a corporate training specialist at Hewlett-Packard. I have been involved in business/education partnership programs for approximately 3½ years. Prior to the bill that initiated some of the California equipment-giving, I was responsible and director of an exemplary California partnership program called the Penninsula Academies. Hewlett-Packard donated 10 personal computers and other resources to Menlo Alberton High School for the purpose of educating 10th through 12th educationally disadvantaged students. The results from that program have been absolutely exciting.

When the California incentive was passed, we initiated a pilot program of donating personal computers to 14 schools throughout the State. Those schools were selected based on one of three criteria: Either they were in communities where our people lived to facilitate direct and personal support for those schools or they had exemplary computer science programs which we could support and enhance; or third, they had a high population of minority students at the school.

Our objectives really were twofold. One was to train computer science for the small percentage of students that would be moving on for advanced computer science education and therefore would be potential professionals in the high-tech industry. Second, and primarily, the grants were to help integrate computers in the curriculum throughout the high school. The computers would then be used as tools to enhance foundational skills that students need—all of us need—to be successful; skills like decisionmaking, problemsolving, teamwork, communication, and self-worth.

It turns out that we donated three components as part of this grant program. One component was 10 personal computers plus assorted peripherals and software to each school to be used in the classroom. A second component was teacher training for each of these schools, and a third component was the technical assistant, a liaison, a volunteer from HP to work with each of these schools to give them technical assistance, installation assistance and advice on curriculum.

The informal feedback was that the schools have predicted a significant exposure of these computers to about 550 students per school either in a 1-week orientation or a full semester class in the first year.

The number of teachers that will be exposed to the equipment and be trained on it are approximately 33 teachers per school. The teachers have told us however, that the most important component, the most important aspect of that grant to them was the liaison, the Hewlett-Packard volunteer to work with them.

Without that liaison, they felt the equipment would not have been effectively utilized. In fact, it may have been dysfunctional. This is not surprising. We looked at the number of hours each liaison spent in each school over the first 4 months and found that 56 hours per liaison per school was the need, a real need, that would not have been met without that interaction.

Based on those experiences, I would encourage three things. One is to continue providing the ability to donate computers to schools. The second is to insure that schools are aware that computers are tools not total solutions. Districts must integrate effective software, integrate teacher training, integrate some form of security for the equipment, and ongoing maintenance that many districts don't particularly budget for as they go along. This doesn't need to be included in the bill, but somehow schools need to be encouraged in these areas.

Third, I think many of us overlook one key component; the teacher. The teacher typically gets caught in the middle of this transition into high technology. They may be able to get technical training, but nonetheless, I think it is important to provide more for the teacher. We ought to encourage the giving of equipment to enhance teacher productivity.

Why not allow grants for indirect educational use of the computers? By indirect, I mean administrative uses by teachers and departments so that teachers can speed up some of the things that now take a great deal of their precious time, testing, grading, reporting, exams. This will enable teachers to free up their time so they can spend it where it is most needed, face-to-face with the students.

Thank you.

[The prepared statement follows:]

STATEMENT OF GARY L. GUBITZ, CORPORATE TRAINING SPECIALIST, HEWLETT-PACKARD

Mr. Chairman and Members of the Subcommittee: My name is Gary L. Gubitz. I am a Corporate Training Specialist for Hewlett-Packard. I serve as the coordinator of Hewlett-Packard's recently formed California High School G.I.F.T. Program (Grants for Instruction in Future Technologies).

HEWLETT-PACKARD COMPANY RESPONSE TO CALIFORNIA K-12 CHARITABLE CONTRIBUTION DEDUCTION

Recent California tax legislation (A.B. 3194) signed by Governor Deukmejian on September 29, 1982, provides incentives for corporations to make contributions of computers to California's K-12 schools, both public and private. Contributing corporations are entitled to a tax credit equal to twenty-five percent (25%) of the fair market value of the donated equipment. Prior to enactment of this bill, Hewlett-Packard was actively involved in an exemplary California high school partnership called Peninsula Academy. The pilot G.I.F.T. program, initiated because of the California tax legislation, is a current program by Hewlett-Packard with two broad objectives:

1. Increase general student awareness and competence with personal computers; and

2. Develop in high school students the fundamental skills necessary to succeed in the dynamic high-tech world of tomorrow. Skills such as problem-solving, systems analysis, critical thinking, learning strategies, and decision-making are important to the long-term success of our young people.

To achieve these objectives, Hewlett-Packard has provided a package of resources for each 14 high schools in California. The schools were selected on the basis of their proximity to an Hewlett-Packard facility, their having a significant number of minority students, or an existing computer curriculum. In addition to the vast volunteer network Emery referred to previously, the package of resources each school received was ten (10) HP86 Personal Computers, an HP86 2-day Training Course, and a volunteer Hewlett-Packard Liaison (a technical advisor to work personally with each school to answer any questions that may arise). Also, Hewlett-Packard is (1) providing a forum for these teachers to share curriculum and staff development ideas, and (2) having expert teachers actually design two courses in computer literacy and programming that will be shared among all the schools. Initial feedback from these schools indicates that Hewlett-Packard liaisons are the key to successful incorporation of the computers in the high school curriculum. It may interest you to know that the total number of liaison hours per school over the first five (5) months of the program was 56¾ hours. We recognize that other companies are involved in computer contribution programs, and we feel the ones that will make a significant impact will include teacher training and personal assistance along with the computers and software.

Based on feedback from high schools and our experience with the G.I.F.T. and other high school partnership programs, we would encourage the integration of computers in K-12 at three (3) levels. These three (3) levels are:

(1) Support efforts to donate equipment which may be used for teacher administrative purposes. This would stimulate teacher literacy, teacher support for computers, course curriculum developed by the literate teachers, and most importantly, would insure teacher productivity.

(2) Support to fully equip classrooms with sufficient numbers of computers to enable each student to participate on a regular basis. Although this will impact

fewer high school students, it will reach those students who are potential future professionals in the high-tech industry; and

(3) Stimulate educational software development to ensure the computer grants meet curriculum objectives.

RECOMMENDED CHANGES IN SECTION 170(e)

Hewlett-Packard Company supports several changes in Section 170(e) to provide further incentives for grants of scientific equipment to educational institutions by a broader range of corporations.

Elementary and secondary schools

First, and perhaps more importantly, the eligible recipients should be expanded to include secondary and elementary schools. Institutions of higher education would be joined by these other educational institutions in receiving the benefit of incentive provisions. In this way, a much broader student population would share in a nationwide movement to expand computer and science literacy.

Use in all education, including community colleges

Another change would be to increase the permissible uses of qualifying equipment to include equipment used in the direct education of students in the United States in all disciplines. This would allow a broader range of students and programs to use computers, which will add significantly to the general computer literacy of future generations of Americans and which will certainly enhance the overall productivity of the U.S. economy.

This change would also make it quite clear that equipment which will be used in community colleges for technical, as opposed to scientific, training will also qualify for the tax incentive.

Equipment should include computers for all applications

We recommended that the definition of the equipment which qualifies under Section 170(e) should be expanded to include technical equipment or apparatus in addition to scientific equipment or apparatus. This change will make it clear that items such as computer or computer peripherals used in a non-scientific application would unquestionably qualify.

SUNSET PROVISION IS INAPPROPRIATE

Hewlett-Packard Company strongly believes that there should be no sunset provision in legislation which expands the incentives for giving scientific and technical equipment to educational institutions. There are a number of reasons for this belief.

First, computers and the equipment used in scientific and technical fields become more sophisticated at an ever increasing rate. The need of our schools for new, sophisticated scientific equipment will continue for the foreseeable future, much beyond the duration of any sunset period.

Second, the need is probably much greater than can possible be met in one or even several years, even assuming substantial increases in school budgets, as well as grants by equipment manufacturers.

Third, the educational process requires teachers, textbooks, and a curriculum, in addition to computers and scientific equipment. Allowing a program to develop over a number of years will allow better utilization of all resources devoted to education. For example, it is not clear whether one computer in every school would produce a better, similar, or worse result for the nation than two computers in half the schools, or a computer lab in a quarter of the schools. A longer-term approach would allow computers to go first to the schools that are best prepared to use them for instructional purposes, and then to other schools as teachers and curriculum become better adapted to undertaking this kind of new challenge.

Fourth, the long experience of Hewlett-Packard Company at granting equipment has shown us that corporations that do not currently make substantial equipment grants may require several years to learn to make such grants effectively.

CONCLUSION

In summary, Hewlett-Packard Company is delighted that this Subcommittee is considering new ways to broaden categories of eligible recipients of equipment by proposing new Section 170(e)(5).

We believe that Congress can do this effectively by the following amendments to proposed Section 170(e)(5) of the Internal Revenue Code:

1. Delete references to 1984 in subparagraph (B)(iv)(II);

2. Modify subparagraph (B)(vi), which defines qualified contribution of computer equipment, to read as follows: "the property is computer equipment substantially all of the use of which by the donee will be at the institution directly *or indirectly* in the education of students, . . ." (Proposed additions italic.)

Chairman STARK. Thank you very much.

Lillian Heller is here as the director of Kaypro's for Kids, from the Kaypro Corp. Lillian, we have your statement which will appear in the record in its entirety and you may proceed to expand on that in any fashion you wish.

STATEMENT OF LILLIAN HELLER, DIRECTOR OF KAYPRO'S FOR KIDS, KAYPRO CORP.

Ms. HELLER. Thank you, Mr. Chairman.

In accordance with the legislation, we conceived plans and set into motion the grant program entitled Kaypros for Kids. What Kaypros for Kids does is identify key teachers within junior high and high school settings who either have some basic computer knowledge or have the willingness to learn.

These key instructors have developed curricula or plans for programs incorporating the use of the computers. Kaypros for Kids then donates two personal portable computers to the school for purposes outlined in the proposal. What we did when we were planning the program, really, is meet with people in the TECC center, meet with people who are members of the Commission on Industrial Innovation and talk to them. Some of the original ideas we had planned went through a number of revisions and we feel that our program really addresses some of the needs that we heard earlier in terms of teacher training, and peripheral problems, primarily because our system comes equipped with two disk drives and the monitor in one unit.

In addition, we took a slightly different turn. Instead of concentrating on computer science and math, we geared our program more toward the use of the word processor, encouraging basic writing skills that all students need.

We feel a great need exists for the students of the social sciences, the humanities, the language arts, and English. What our program does is address those needs.

The proposals were received. Most of them were accepted, some were rejected, others resubmitted under sponsorship. We set the delivering process into motion by calling everyone together, opening up machines, giving them hands-on basic training, and then sending them home on the spot with their machines. This happened during the summer.

We moved very quickly. We are working under the sunset of June of 1984. If it had been a longer time period, if it had been the 5 years for instance, I am sure we would not have placed machines yet. We have currently some 500 systems out there. We have plans for more. We have taken a regional approach. This has been carried out in San Diego County so far. We have plans for Kern County next, with the original proposals coming in to us, I believe, the 15th of this month. The donation, the actual receiving of the machines by the schools is scheduled for December 6 and 7, and overall, what we do is really concentrate on the individuals who will make the difference right now.

Other than that, I think I have summarized the text. It will be included.

[The prepared statement follows:]

STATEMENT OF LILLIAN HELLER, DIRECTOR, KAYPROS FOR KIDS, KAYPRO CORP.

Kaypro, along with most other companies, receives large numbers of requests for donations of time and equipment. These requests come from a variety of sources including individuals, not-for-profit organizations, new ventures, and educational institutions. Before the California Computers in Schools Tax Credit (AB3194) was enacted, Kaypro made selected donations to these groups, and will continue to do so, without regard to additional tax benefits. What the legislation allows us to do is more, much more.

In accordance with the Legislation, we conceived, planned, and set into motion our Grant Program entitled, "Kaypros for Kids." What Kaypros for Kids does is identify key teachers within a junior high or high school setting, who either have some basic computer knowledge or have the willingness to learn. These key instructors have developed curriculum or plans for programs incorporating the use of computers. Kaypros for Kids then donates two Kaypro II personal portable computers to the schools for the purposes outlined in the proposal.

In June 1983, we initiated Kaypros for Kids by sending letters to all principals and superintendants in the San Diego County area. We encouraged key individuals to submit grant proposals making use of the Software Applications which come bundled with our computers, especially the Word Processor. The Kaypro II which is being donated under this program, is precisely the same machine which is sold through our dealers throughout the world. The software bundle includes Word Processors, Spelling Checkers, Electronic Spreadsheets, Filing System, and Programming Languages. We encourage the use of the Word Processor as the primary application because writing skills are a basic part of every student's education. In addition, we designed Kaypros for Kids to address the needs of students involved in all disciplines, not only the hard sciences.

HOW KAYPROS FOR KIDS WORKS

In San Diego County, key teachers submitted grant proposals limited to not more than five pages each. These proposals outlined the intended use of the Kaypro Computers, how the programs would be implemented, and who would be responsible for carrying out the programs. In addition, we asked that goals and timelines be set, and that the pilot schools send us feedback at the end of the year.

The proposals were reviewed, most of them were accepted, some were rejected, others resubmitted under sponsorship. We wanted to do our best to see that these donations did not end up as very expensive paperweights. In the original letter we sent to the principals and superintendants, we stated that a condition of receiving the Kaypro computers would be that at least two of the key individuals would receive training on the computers along with introductory Word Processing. Since Kaypro is primarily a hardware company, we were not equipped to provide this training directly from the factory. We made arrangements with training companies, supervised course content, and provided a situation for our pilot schools to receive this training for a nominal fee.

THE CHALLENGES OUR TEACHERS FACE

We, at Kaypro believe individuals can and do make a difference. Our program is built around, and in support of, teachers who are rising to meet the challenge of modern technology.

There are serious personal and professional issues facing our teachers today, with regard to computers in the schools. The teacher is faced with becoming proficient with the new technology and then passing that knowledge on to the students. Difficulties arise when there are students who begin the class with much more experience and understanding of the machines and how they work, and the teacher must adapt to a role of helping and guiding the student's learning, as well as the teacher's own learning. The traditional concept of "teaching" is changing rapidly, and learning is becoming more of a shared activity between teachers and students.

Many of our pilot schools have peer teaching programs, and after school programs that involve parents with computer course alongside the teachers and students. Interestingly, the presence of our computers in the schools appears to be increasing parent involvement.

KAYPRO INVOLVEMENT WITH SUPPORT GROUPS

In addition to the computers which were donated to the pilot schools, Kaypro donated computers to the San Diego TEC Center, and the San Diego Chapter of Computer Using Educators. Both of these organizations provide support and assistance to San Diego County Teachers working with computers in the classroom.

We are here today to share our experiences with the California Computers in Schools Tax Credit Legislation and to evaluate its potential viability at the Federal level. On behalf of Kaypro, I can tell you that without this Legislation, Kaypros for Kids would never have been possible, and there would be approximatly 500 less systems in our schools. All of the students being served by these computers would be still waiting to learn what this new technology can do for them.

There is a great need for additional computers in the schools, and this legislation has done much to begin to meet that need. There are many grant programs in effect in California, each manufacturer develops their program to fit their overall philosophy and structure. It is exciting. It is rewarding. However organizing, developing, and carrying out a program such as ours, or that of any other manufacturer, requires a large commitment of time, money, and energy. As amazing as it might seem, it costs a great deal to give away anything, especially computers. We feel imposing additional stipulations to qualify for the tax credit would stifle the enthusiasm of manufacturers to give large numbers of systems because to do so would increase the manufacturers administrative costs. Manufacturers gain exposure in the schools when systems are donated. There is no question about that, but the immediate benefit is gained by our students, our society and our future.

Chairman STARK. Thank you very much.

Finally, Mike Rashkin of Apple Computer, with whom I have worked early on in drafting this legislation and I know had an important role in drafting the State legislation. I am not sure exactly what your correct title is, Mike. Maybe you, for the record, can give that.

Mr. RASHKIN. It is director of taxes.

Chairman STARK. Director of taxes for Apple Computer. I am not sure whether you have a statement, but you sure have something to add.

Mr. RASHKIN. There are a few things I would like to just supplement some of the things Barbara Bowen had said about the California program. That program put $20 million of computers into the schools in California. The total cost to the State of California was $4 million.

Chairman STARK. Are you convinced that $20 million is a hard figure? I mean, if the schools had gone out and shopped, could they buy them at a discount?

Mr. RASHKIN. That is the price at which we sell those products to schools.

Chairman STARK. OK.

Mr. RASHKIN. It cost Apple Computer $1 million to do that. Under the current bill, H.R. 701, we see a similar kind of relationship. The Government would pick up about 75 percent of the cost, and the manufacturer would pick up about 25 percent of the cost.

Chairman STARK. So what you are saying is the cost in that $20 million—out-of-pocket cost was about $5 million, of which you were down $1 million in cash and the State lost $4 million in taxes that they would have otherwise collected.

Mr. RASHKIN. That is correct.

Chairman STARK. OK.

Mr. **Rashkin**. I would also like to point out that in terms of the limitation on the number of computers that one can give and the 10-percent limitation, first of all, I believe the current bill is 10 percent, not 30 percent, as was previously referred to by another speaker, but in California, if there were a 10-percent limitation or any kind of limitation, we could not have given one computer to every school in California.

To have a limitation based on profits, I don't necessarily see the public policy for that. What we would suggest, as Barbara mentioned before, was substituting for this particular contribution provision a different type of limitation, one perhaps based on number of computers per company or number of computers per school or something of that nature.

That is about it. If you have any questions, I would be glad to answer them.

Chairman **Stark**. I want to thank the panel. I have a couple of comments, I guess.

One I think most of you know but it is important for the public to realize that our committee really only deals with taxes and it is very difficult, while we are very sympathetic to the idea of requiring training and encouraging more complex programs of donations in helping the schools, many of the issues which you address are hard to accomplish through a tax code which, God knows, is overly complicated as it is. Oftentimes, we are just better off creating some incentive in the tax code and hoping that either through the goodness of your heart or sound planning that the right results will come out.

When you try to write some of these things into a tax code, you often find that you have Congress designing a camel and so when people, and particularly those of you in the educational community, wonder why we are not encouraging more or putting more restrictions or doing other things, there is a limit to what we are able to do through what is primarily a tax incentive.

I know that we had hearings here not so long ago that Congressman Miller chaired in San Francisco on the Vocational Education Act, which is perhaps a more appropriate forum for some of the things that the witnesses this morning have addressed and which I concur.

Second, the concerns, and some of you have addressed them, in terms of companies tending to want to contribute in areas where their employees live and work and where their employees' children go to school—and I say this not in a pejorative sense, but does tend to leave some of the poorer districts or areas of the country which have less industrial development without the same kind of attention paid to them just because of the fact that they may—Appalachia, as an example, is not apt to have many high-tech companies in the backwoods of West Virginia, and they are just not as apt to get it because we are not aware of it. To some extent, we feel that if we are spending taxpayers' dollars, there should be an incentive to see that we do spread the computers around, I think, understanding it is probably more desirable to have them grouped as a teaching tool.

I guess, finally, I think if my memory serves me, Lillian Heller, for better or worse, got some training years ago as a page in the

House of Representatives and went to the Page School. I hope that somewhere along the line, we have remembered to donate some of this equipment to the newly restructured Page School in both the House of Representatives and in the U.S. Senate. We are often very proud, in spite of the unfortunate publicity in the past, of the pages and the training and the real work they do for most Members of Congress, waking us up and getting us where we ought to be on time. You were there when?

Ms. Heller. 1978. I served for Congressman Fulton, who is now mayor of Nashville, Tenn.

Chairman Stark. Mayor of Nashville and was a colleague of mine on the Ways and Means Committee and who we miss.

Again, thank you for your service. I want to thank the panel for their testimony this morning.

We are going to break for about 5 minutes to give the reporter and the chairman a chance to stretch. It is the intention to go right on through without breaking for lunch. We will call the panel of Mr. Finkel and Ms. Goodson and Kay Pacheco next. We are going to add Thomas Heineman to that panel.

We will start in about 5 minutes. We will go on through lunch. If anybody wants to get a sandwich and munch it in the room, why, they are welcome, and if anybody—so I don't want to keep those of you here. We will take a 5-minute break and we will start with the next panel.

[Recess.]

Chairman Stark. The committee will resume and I will invite the panelists for our next panel to proceed. I have LeRoy Finkel, who is instructional computing coordinator of the San Mateo County Office of Education. OK, Mr. Finkel, and Kay Pacheco—I want to identify all of you for the reporter—who is director of the educational development services, Alameda County Office of Education; Thomas Heineman, on my far right, who is from the Livermore Valley Unified School District and he is the coordinator of the instructional materials center; and we have Ms. Bobby Goodson, the past president of Computer-Using Educators, and Ms. Goodson is on the far side of the reporter.

Why don't you begin in the order you are listed on the sheet, Mr. Finkel starting first. If you have prepared statements or additional material, they will appear in their entirety in the record and you may summarize for us your comments this morning.

Mr. Finkel, do you want to start.

Mr. Finkel. No; Bobby is actually going to start our presentation.

Chairman Stark. OK.

STATEMENT OF BOBBY GOODSON, PAST PRESIDENT, COMPUTER-USING EDUCATORS, INC.

Ms. Goodson. Thank you for this opportunity to come and share with you some of our experiences and some of our thoughts. LeRoy and I represent Computer-Using Educators, which is an organization of classroom teachers, about 7,000 strong, most of them in California, but others throughout the United States and several other countries.

We are basically K-12 teachers. Our organization was born out of the need support for and the sharing of experiences and the sharing of materials. Our concerns are for the training that we know is needed because we feel it individually and we see it in our colleagues, the need for planning within a school, within a district, and indeed, throughout the country, a very strong need for support of programs that go on for support of ideas. There is a need to arrange for and plan for the planning course support. That is the backbone of our organization.

I think one of the things that I would like to express beyond what is written in our written material, which we have given you, is that we hope that people realize that the classroom teacher is in the forefront of this whole move for technology in the classroom. We would ask that you recognize that there is a great deal of expertise already out there in the classroom teacher. It is a marvelous spot for a classroom teacher to be in, to know that there is something new happening and they are there first. They may be struggling, but they are doing it, and as plans are made and programs are put in motion, do look to those classroom teachers for the expertise that they are already developing.

We have a strong concern for the planning that goes into programs of technology and education. The success of a tax-incentive program, the success of a program for technology in the school is, I think, directly proportional to the amount of planning that goes into it.

Many good things are happening throughout the country. There is a real driving need for us not to reinvent the wheel. We don't need to start from scratch anymore. We started from scratch 7 years ago and we have learned the hard way over the last few years. There are many good things to build on and what we need are better networks for sharing those good things.

The things that have happened in California, we have learned a great deal. We enjoy this opportunity to share with you the things that we have learned in the hopes that it will make the program better throughout the country. We would ask that you be aware of what is already out there and build on that.

I would like to take just a minute to briefly say some of the things we learned from the California program. We were proud to be a very strong part of the planning of the California program, and I think this is why I stress the need to be aware of what is there, because as the California program was developed, we had an opportunity to give input to it.

We learned some very important things. One was that there is a variety of models of implementation. There are a variety of models of giving. You heard from several very good ones and very different ones this morning. Every one of them had their own characteristics; every one of them was successful.

The Apple model was marvelous. So was the IBM model, so was the HP model, so was the Kaypro model and there are many others. So the legislation—it is important that the legislation allows for a variety of models that will fit the system, will fit the company, will fit the school. They all have things to give and so do allow the flexibility and variety of the programs as we go ahead.

We feel very strongly that it is important to give complete systems. We stressed that in California and it has been, I think, very important, and it needs to be a part of the program. Somebody said something about a one-legged chicken and we really don't have room for any of those in our classrooms and our system is very important.

Everyone has said it, and I can only emphasize it, that training has to be a part of it, but again, we want you to remember that there is a variety of training. There is that training that says, "This is how you set it up and this is where you turn it on and this is where you stick the disk." That is very important, but then there is ongoing training and someplace in this package, we need to have an arrangement and allowance for ongoing programs.

In California, that is provided in our TECC centers. Nationally, we hear talk of regional centers. We would support that kind of thing as long as they are centers for training, as well as for research. We need the research and development but we desperately need the training, some sort of center that will provide training.

One of the things that we find very useful in training is the development of a cadre of trainers and this can very often be done in a regional center. There are people in classrooms that could become trainers with the recognition and with the help and we can build on that expertise that is out there.

The third thing that we have learned and we would want to emphasize with you is the need for support material. A black box, as you have said, by itself is not an effective addition to our educational system, but the support material that is needed with it can make all the difference in the world. This can be manuals, it can be books, it can be software, it can be a variety of things, depending upon the system and its use, but we want to stress that you give concern and allow for the inclusion of all kinds of support material in this program.

Those are the things we have learned. I think LeRoy may want to expand on some of those, but we certainly support you in this legislation and hope that we, as an organization, can work with you and support this effort in any way we can.

Thank you.

[The prepared statement follows:]

STATEMENT OF MRS. BOBBY GOODSON, PAST PRESIDENT, COMPUTER-USING EDUCATORS, INC., COMPUTER RESOURCE TEACHER, CUPERTINO UNION SCHOOL DISTRICT, AND LEROY FINKEL, BOARD OF DIRECTORS, COMPUTER-USING EDUCATORS, INC., INSTRUCTIONAL COMPUTING COORDINATOR, SAN MATEO COUNTY OFFICE OF EDUCATION

During the Oct. 12, 1983 hearing in Washington, Gov. Jerry Brown spoke to you about a grass roots teacher movement organized to help bring computers into the classrooms of California. We represent that organization, Computer-Using Educators (CUE), now numbering nearly 7000 educators, most of whom are from California but many are colleagues across the country. The focus of our efforts has been on the use of computers in the classroom in K-12, rather than administrative use of computers. Our organization came into being to help meet the need for teacher training in this new field, to assist schools and districts in planning for the use of computers, and to act in a support capacity to schools as they proceed with their plans.

For many years, going as far back as the early 1970's, California schools have been receiving "gift" computers from manufacturers and businesses. While many of these early experiences were very positive, there were some that had a decidely negative effect on school computer use. Based on some of these negative experiences, we feel we can make some constructive recommendations to you that will help assure success of future computer gift plans.

The current California legislation, the Imbrecht Bill, allowed enough flexibility to contributing companies that we have seen many different models for gift giving, each designed to best fit the goals and the needs of the individual contributing company. We have learned from this experience that built-in flexibility will encourage more firms to participate in a program and schools will be more creative in the ways that they use the computers. In the case of Apple Computer Company, before they proceeded to far in their planning, Apple representives came to CUE and asked us what we thought would be necessary to make the program most successful, from the standpoint of the schools. We were emphatic that any gift be a complete computer that would not require that the school spend additional dollars to make it usable. We stressed the need for support materials and software to accompany any hardware gifts, the need for training at least one teacher in each school, and the need to support additional training as that need became apparent. The result was the "Kids Can't Wait" program which offered one complete Apple IIe computer to each school in California, complete with all manuals and some software and a requirement that one teacher or administrator participate in a dealer-delivered training session. Although not eligible for the Imbrecht tax credit, Apple Computer Company donated five complete computers to each California Teacher Education and Computer Center (TECC) on the assumption that these centers would provide additional training and support needed to insure a successful program.

Another well-planned model is currently being implemented by IBM in three states including California. An article in the December, 1983 issue of Popular Computing Magazine describes how IBM hired Educational Testing Service (ETS) to design and implement a limited gift program. Again, leading educators from throughout the country were consulted to help in the design of the program. As a result, the IBM program provides for extensive and ongoing teacher training and support being provided by a cadre of computer education specialists. Each school in the program is able to communicate electronically with their trainer and with other schools in the program. The IBM program also includes participation by a variety of other firms who have contributed software and hardware to the schools.

These two models involve many schools and were very expensive to implement. They are successful because they provide a complete hardware, software and training package to the participating schools. There is room for less grandiose programs that may meet the special capabilities of schools and companies. We would not want to see legislation that might exclude the less comprehensive program, but we feel any program must include training and support, not just computer hardware.

There are a number of issues or concerns that we would like to emphasize. First, any legislation should include the same tax benefits for software and training as for hardware. Software is essential to the successful use of computers in the schools. Many small cottage size software firms would be able to participate in a gift program if tax incentives were allowed.

We feel that legislation should allow as much flexibility as possible. Teacher training is an essential ingredient to a successful program. But not all firms have the capability of providing a complete training program themselves. Just as IBM contracted with other agencies to provide their training, so other companies should be allowed the flexibility to do the same. Universities, Community colleges, and teacher centers could all be employed to provide the needed training. Including training in the tax legislation is the important key. The success of a program will be enhanced by a complete training program that goes beyond merely teaching about the operation of the computer and includes the application of computers in regular instruction.

We feel the legislation should not include any mention of exact hardware configurations. Because of variations between companies and the vast variety of school uses, mentioning an exact configuration would be restrictive. The requirement of a "complete" computer system is all that is needed.

The subject of equity has been mentioned in previous hearings. We would like to emphasize that we support legislation that allows gifts to all schools, K-12. While some gift programs have focused on high schools, we feel there is just as much need for computers in the elementary and middle schools, if not more. We are concerned that companies should make every effort to spread their gift computers throughout the community but feel that legislating such activity may inhibit smaller firms from participating in the program at all.

Perhaps, yet another piece of legislation is needed. To optimize and maximize the effectiveness of this piece of legislation, schools should be planning how they will use and care for computers in the classroom and how they will train their staffs.

Where such plans have been developed, districts have been able to make effective use of computers much more quickly than when no plans existed. Legislation to support such planning would help guarantee the success of the overall introduction of technology into the classrooms of America.

Thank you very much.

Chairman **Stark**. Thank you very much.

Mr. Finkel.

STATEMENT OF LE ROY FINKEL, MEMBER, BOARD OF DIRECTORS, COMPUTER-USING EDUCATORS, INC., AND INSTRUCTIONAL COMPUTING COORDINATOR, SAN MATEO COUNTY OFFICE OF EDUCATION

Mr. **Finkel**. As long as Bobby is touting teachers, and since neither one of us is any longer, I should mention that up until 3 years ago, I was a computer-using teacher in the classroom, and Bobby was up until this fall.

There are a number of concerns that we would like to emphasize. I feel it is a little bit redundant but worth repeating. First, I would like to see the legislation specifically include the tax benefits for software and training as for hardware, and other intangibles as well.

We are enjoying the benefits of reduced rates through Compuserve at the moment. I don't think the current legislation would allow Compuserve to qualify at all for any tax benefits. This is really leading-edge stuff and is also allowing computer educators to communicate across the country. So the same tax incentives which are allowed for hardware, which I realize are pretty easy to do, should be allowed for software and training as well, particularly in the area of software, since it is essential to the successful use of computers in the schools for everything other than computer science teaching.

I am also thinking that many small cottage industry firms would be willing to participate in a gift program if there were tax incentives, but with software specifically excluded at the moment, or generally excluded at the moment, small firms can't participate.

I think the thrust of our remarks tend to focus around flexibility. Teacher training is an essential ingredient. Apple was able to use their local dealer network. IBM, on the other hand, hired an outside service and Hewlett-Packard is using their own employees, as I believe Kaypro is as well.

We would like to see the legislation be as flexible as possible so outside agencies, both profitmaking and nonprofit, could be included to provide the teacher training for those firms that don't have the staff to do it. I am thinking of universities, community colleges, teacher centers such as our TECC centers, could actually be employed or somehow or another be tied into the teacher-training activities.

As Bobby indicated, it would be nice if the training could go beyond just merely teaching about how to use computers and focus its attention on how to use computers in the classroom, which tends not to be done today.

We have seen a piece of legislation that specifically states the exact hardware configuration that should be donated and I should like to vote no for that. I think as Bobby indicated, the requirement of a complete computer system so the schools don't have to lay out any additional funds is legitimate, but to specify that it must be a dual drive, 80 column, et cetera, et cetera, et cetera, is unnecessary and I think it is a poor choice.

Now, the subject of equity has come up in previous hearings and while I am fully supportive and I think we are fully supportive of the notion that we should try and get computers wherever and whenever—in Apple's case, they gave one to every school—I think it is going to inhibit small companies from participating in a program if that is placed there. We have some small companies in this area that are contributing to these programs without those restrictions.

We are concerned about equity, spreading the computers throughout the community, but let's not inhibit smaller firms from participating purely on that basis.

Perhaps another piece of legislation is needed and I think there is one in the hopper at the moment, but it would tie in nicely with this one. Lillian mentioned that—or in Lillian's presentation, there was mention of a grant, essentially schools had to submit a proposal saying how and why they were going to use the computers.

As Bobby indicated, the more planning that takes place, the better in terms of the implementation of the program. Perhaps another piece of legislation should be implemented that would deal with that planning issue and allow schools the opportunity to do some dollars that would give them the opportunity to get dollars for planning so that when the computers arrived on their campuses, they would know what they are doing, because that seems to be the problem we are having now, as many of them don't know what they are doing.

Thank you.

Chairman STARK. Thank you. I think I ought to point out here that many people have indicated that we should have deductions for training, but in the Tax Code, we have never allowed a deduction for personal services. I think the reason you begin to see if you have a professional football player or baseball player making $1 million a year and if they make an appearance for what they might normally charge thousands of dollars, they could run up tremendous donations. There is really no way for us to value an hour of someone's time.

We run into a little bit of the same problem in software. Once the sunk cost in developing a piece of software is recovered, I would imagine the time to copy it on a disk—there is very little cost. Now, if a company had only $100,000 in profit, all they would really have to do is print up 100,000 $10 pieces of software which would have almost no cost to them, mail it out and say, "That is a donation," and we just have no real way of controlling it. It is a problem that we have in the Tax Code.

We are not unmindful of it, but I just wanted those of you in the education business to understand that we have some problem in how to control that and how to measure it.

Our next witness, Kay Pacheco, is the director of the Educational Development Services, the Alameda County Office of Education. I have your statement, which I have been looking at. If you want to expand on it or summarize it or read it, however you are comfortable, the mike is yours.

STATEMENT OF KAY PACHECO, DIRECTOR, EDUCATIONAL DEVELOPMENT SERVICES, ALAMEDA COUNTY OFFICE OF EDUCATION, AND TEACHER EDUCATION COMPUTER CENTER

Ms. PACHECO. Thank you. As has been mentioned, I am the director of the educational development services in the Alameda County superintendent of schools' office. I also am the director of one of the teacher education and computer centers in California, the one that serves both Alameda and Contra Costa Counties.

The TECC represents 38 school districts in the two county area. Most of those districts participated in the "Kids Can't Wait" program, have received computers from IBM and have also received computers from Commodore. Thus, I have extensive experience watching how schools have participated in such a donation program.

I would like to summarize my comments by responding to the question that I was asked as I came in: "How effective are the donations in providing some kind of educational service to the community."

As an added note, I am also the parent of a 14-year-old girl who is entering high school this year and a 10-year-old who is in fifth grade. So I am not only looking at this issue from a professional standpoint, but also from the perspective of receiving some of the benefits as a parent. I am particularly interested in how my own children are integrated into the technological society that we live in.

In the geographical area that the TEC center serves, we have trained over 2,500 teachers in the use of the computers. One of the major benefits that I see in a donation program is that school districts become more aware of what is available, technologically speaking. Schools tend to look at the equipment that is donated and then expand those donations far beyond the original pieces of equipment. They may not always purchase the same brand of equipment that was donated, but they will at least begin thinking and planning about how to use computer equipment.

Several donation models have been used in our area and all of them have provided very different results. The wide dissemination model that Apple used provided the access to a broad base of students. We are all very concerned about this issue of access. The access that was allowed in the Apple donation program influenced many schools to change the way many teachers taught and allowed additional insights about the way many students learn.

A second model, used by IBM, concentrated computers in a single location and tied those computers to a university program to do in-depth work with school sites. This model lends itself to heavy research and application work. Proven products resulting from such in-depth study are generally much better than a lot of the public domain materials that we get.

Finally, the donation of one or two pieces of equipment from small companies has been particularly useful in setting up demonstration centers where teachers can practice on various kinds of computers.

All of the variations on donation programs are extremely helpful. The comment that has been made previously by others allow flexibility for companies who wish to donate and would encourage continuance of all of these programs.

As the director of a training program, I really would be remiss not to mention the training issue mentioned by others. I understand that training may not be appropriate, necessarily, for a piece of tax legislation. However, I am concerned that the $4 million that the State of California lost as a result of giving away computers would have gone for nought had the teachers not been able to use that equipment. Therefore, I think we are looking at effective use of tax dollars, as well as just providing deduction incentives. That is one reason why the training is absolutely essential.

If you look at the research about the introduction of computers in the work place, you will find that there is a learning curve that begins with a very difficult period of reluctance. Most adults seem to have a great fear of learning new skills. We aren't like the kids who just jump in and are not afraid of being the new kid on the block. We are professional and we are supposed to know what is going on. When the student in your classroom comes to tell you how to program your test-making process, it is a little disconcerting. This fear and discomfort causes a great deal of reluctance to learn this new technology. This reluctance can be eased with training.

I would like to comment on the Hewlett-Packard model where liaison business people come to the workplace we call education. Tom might want to talk about another such program that the Livermore Unified School District has used with the Lawrence Livermore Lab. These programs are really mentor programs. California teachers are beginning to recognize the mentor concept as extremely important in keeping the technology in the classroom current. In the last several years, education has not been able to keep up with the technological advances. This is not true in the computer area, but it is also true about the method of teaching.

I would like to mention some of the benefits that having computers in the classroom do provide to teachers. There is a very different way that students learn when there are computers present. There is an article in a recent educational magazine called "Phi Delta Kappan" where the changes in learning are summarized:

One, there is more active learning on the part of students. I can personally testify to the truth of that statement. My 14-year-old is an average, typical female student who is really afraid of mathematics. In second grade, she was diagnosed as learning disabled. She was two grades below grade level in mathematics and was above grade level in reading. We have worked very hard to overcome the math deficiency. I can tell you that one of the strategies that made it happen was the use of a computer. She is able to sit by herself and not have her parents making judgments about how it is very important to learn mathematics, nor having other kids sit around judging on how she was learning. It is very exciting for me to see her yell and scream in the den as she is saying, "I got it, I got it." She is currently in an algebra I class in high school so that means that her test scores have certainly changed since second grade. It is an emotional touch for me; you can hear my voice. It is less mental drudgery for a student like my daughter to study mathematics and science with a computer.

Two, the learning process on a computer happens much more rapidly than when a teacher and a student are interacting. Because the speed of the computer is much closer to the thought process, the student and the computer go along together at the same speed. When teachers and students work together, the difference in the speed of each person's thought process causes real problems for the student.

Three, there is more independent learning with computers as well. All of us are interested in fostering independence. Independence is also one of the skills you need when you work, whether or not you are using computers. Educators have had a hard time finding how to develop that independent learning and to help students translate that skill to the workplace.

Four, the computer offers incredible new ways to gain insight about very abstract concepts and thoughts. You can manipulate very complicated concepts on a computer screen that you cannot build, feel and touch. The result is that more complex ideas and principles can be introduced to children at much younger ages. That has been a real benefit to the educational community.

Some closing thoughts about give-away programs. I do think that the model in California where the tax incentive program was integrated with other governmental legislation that brought about training for teachers statewide is one that the Federal Government needs to consider. You just can't give tax incentives to companies to provide machines or equipment to schools without a comprehensive plan that results in a long-range effect. The positive effect for education just isn't going to be there over the short run. To provide companies with tax incentives without providing for an educational result is a waste. I am here for the long run and I would like to see something done about a program for training to support the equipment giveaways.

I would further suggest that there be incentives in the program to ensure access to the largest number of students possible. I would also recommend that there be incentives for some kind of a long-term relationship between the companies that give and the educational institutions that receive. Specifically, now that we have the computers in place, there are new applications and new equipment that we need in order to be on the cutting edge of the current technology. We can then be providing education that reflects the state of the art—rather than the obsolete.

Finally, I will again reinforce that the adequate support for training will make the long-term benefits of this computer give-away of great benefit to education and the Nation, as well as to the companies involved.

Thank you very much.

[The prepared statement follows:]

STATEMENT OF KAY PACHECO, DIRECTOR, EDUCATIONAL DEVELOPMENT SERVICES, ALAMEDA COUNTY OFFICE OF EDUCATION

Mr. Chairman and Members of the Field Hearing on H.R. 701, I sincerely appreciate the opportunity to comment on the useful educational purpose served by contributions of computers and other computer equipment to schools in California. My comments are limited to the results I have observed and researched while directing a regional Teacher Education and Computer Center in Alameda and Contra Costa counties over the last eighteen months.

There have been two profound results from the donation incentive programs in California. One result has been a significant increase in student and teacher use of computers to facilitate the learning process. The other has been the increase of business and community involvement in improving the instructional program at the school level.

The literature is bound with ways educators and students can use this new technology. A comprehensive description of the benefits of using computers in classrooms by Decker F. Walker, an associate professor in the School of Education at Stanford University, is in the October issue of the Phi Delta Kappan. Walker has identified seven ways that computers can be useful in education. There are: 1, more active learning by students, 2. more varied sensory and conceptual modes of instruction available to the teacher, 3. less mental drudgery for students, 4. learning occurring nearer the speed of thought, 5. learning better tailored to individual students, 6. more independent learning, 7. better insight into abstract concepts and thought. These benefits are incorporated in the drill-and-practice programs in math and language arts, the writing programs that use word processors, the science simulations, the music theory and ear-training systems, the computor aided design programs, and dozens of other applications of computers in education.

These benefits are only useful if the technology can be applied. The technology cannot be applied without access to the equipment by teachers and students.

The improvement of curricular offerings and increased involvement of local businesses and community members has been a second byproduct of contribution programs. This result was best described by one of coordinators in the Teacher Education and Computer Center in Alameda and Contra Costa counties, Dr. Lynell Burmark, after she visited one of the many schools in our region using the donation concept to go far beyond making one computer available to a school full of students. Dr. Burmark describes this representative effort in an article written for the Computer Using Educators' newsletter to be published in December. She describers the efforts of Mission San Jose High School in Fremont, California to develop a computer lab. With resources of less than $5,000, the parents and staff succeeded in securing a donation from a local company of 16 terminals and a master computer. With various other components donated from local companies and some 5,000 hours of volunteer labor, the terminals were linked to the master computer. The school district responded to the school site's appeal for funds by supplying textbooks and remodeling a classroom to accommodate the computers. A local bank contributed carpet for the classroom and scores of parents and staff volunteered labor for the construction work. This fall a completed computer lab opened with offerings of a Computer Literacy course for sophomores at 7:00 a.m. followed by five periods of Programming in BASIC. The Mission Possible Task Force (as this group has come to be known) is still at work seeking the donation of a 20-ton air conditioner to keep their new computer lab cool.

What students learn and teachers teach using computers will be significantly influenced, over the long term, by the California donation model referred to as the "Kids can't Wait" program. The influence will be significant because of two factors that need to be considered if incentives are to be developed to promote computer equipment donation programs to schools on a national basis. These factors are: access to equipment, and sustained training support to teachers and administrators.

The access factor in the California example included the equal distribution of computers to every school site in the state and placement of the equipment in classroom settings where students has use of the computers on a regular basis. There was also a large influx of money from the state budget to distribute training funds and capitol outlay monies to fifteen regions around the state. These funds were also allocated directly to schools where staff members developed a plan for training teachers to use computers for instructional purposes. These funds were available to schools and regional Teacher Education and Computer Centers prior to the distribution of the equipment and continues to be available after the donation program has been completed.

Just as in the workplace, the introduction of new technology in a school is a traumatic event. Most adults fear the learning of a new skill. Many teachers are hesitant to use computers in their classroom even if the conputer is accessible. This situation occurs because teachers experience something close to "future shock" when computers are introduced in their classrooms. The time and support needed to teach an "old dog new tricks" is extensive. Most of the research studing the computerization of the workplace supports the concept that successful change to the use of new technology requires planned implementation with significant training and coaching support over time. The California experiment is still in progress. At the present time, the support system is in place on a limited basis to train and coach teachers on the use of computers in the classroom.

The donation incentive program made the access factor an instant reality in California schools and I believe it has been a motivating factor that contributes to the improvement of curricular offerings and instructional programs such as the computer lab at Mission San Jose High School. The state funding support for training factor makes the long term contribution of computers to education a possibility.

My recommendation is that any federal plan for a donation program for schools include incentives that insure access to the donated equipment to a significant number of schools so that the results of the program significant number of schools so that the results of the program improve student learning at the most direct level, at the school site. Further, I recommend that there be incentives for a long term partnership between the donating company and the schools that participate in the program. As the schools increase their knowledge and skill in the use of computers, give incentives for equipment to be donated that keeps the "state of the art" in computer equipment used at the school site. Finally, I urge that adequate support for training be an integral part of any legislation that encourages contributions of computer and other computer equipment to elementary and secondary schools.

I hope my comments have contributed positively to your public review of the California programs that increased the availability and use of computer equipment in our schools. Thank you for asking me to participate.

Chairman **Stark**. Thank you, Kay, and we will now hear from Thomas Heineman, the coordinator of Instructional Materials Center in the Livermore Valley Unified School District.

Tom, we have your statement and you may summarize it or add to it or proceed in any fashion.

STATEMENT OF THOMAS HEINEMAN, COORDINATOR, INSTRUCTIONAL MATERIALS CENTER, LIVERMORE VALLEY JOINT UNIFIED SCHOOL DISTRICT

Mr. **Heineman**. Thank you.

What I have heard today is talk about partnership from various representatives from computer industries. We have heard about inservice education, continue emphasis on moving us toward an increasing technological future. What I am going to speak to today is what happens, at least from a district perspective.

Our district, which is Livermore School District, is in proximity to a large national laboratory of Lawrence National Labs. During the last 5 years, our use of computers in our schools has based upon the ability to ask them for assistance, ideas and then continually upgrade our staff expertise. What this comes down to, again, is that partnership in education, not just in California, but we are talking about at a national level partnership.

As we have talked about children, there is a need to assist our children to fully realize their potential as contributing and productive members of society. In order to do that, we have to also provide them the knowledge, skills and opportunities that will allow them to enter that marketplace.

The Apple bill in California was a minimum and a base point for the start. In our district we had begun to implement significant numbers of computers quite a few years ago and all of our schools did have a significant number of them.

A problem that we knew was going to occur was that of staff development and preparing people to implement such technology into the classroom and into the offices. Without this careful planning, we would have just acquired equipment. I believe it has to be left open to the school districts to work with businesses in identifying their needs first and not just be passive recipients of equipment.

Now, we do not need another piece of equipment. We need the ability to say we have specific needs in these areas. It may be software, it may be peripherals, it may be equipment, but we would like to be in a position to work this out through possibly a grant situation where we could work in the development of a program, a relationship with industry.

The other area is that when we talk about successful implementation into school districts, there are three areas that need to be attended to. The first is, which we have all heard, the in-service program. In our district, we believe that hands-on experience is most important to cut the computer anxiety. It doesn't matter what tool you are using, you do have to have familiarity with it. Otherwise, you will have concern. I have that in whatever tool I use.

The second is current and ongoing process where we review all of the software, all of the programs, all the instructional strategies for use in the classroom.

The last is, of course, the providing of the equipment and/or environment or setting for implementation into the classroom. But all along, we have found that the closer the service or the person who has the expertise is to the user, the better it is. So we believe, at least in each of our schools, we need one person there who has background where the teacher down the hall can walk and say, "I am having a problem here loading up my word processor to print," or something along those lines.

We are recommending more than a 1-year commitment by industry. We are looking at a 2- to 3-year commitment with industry, where we can see longitudinal staff development. If it be equipment or software, we are willing to take our discretionary funds within the school district and supplement those for further extension of the educational opportunities for our students and staff.

Last of all, we think it is important to tie whatever legislation is developed with existing structures, both at the State and the county levels. Specifically in California, our teacher education computer centers, TECC centers, such as Mrs. Kay Pacheco is director of, have been invaluable. We saw a 70-percent turnaround type of in-service we needed in our district because of the Apple style equipment effect.

We had been giving training on different types of equipment. We know there is a transfer that can be done, but there is still that psychology of saying, "I don't recognize this piece of equipment." It caused the TECC center to have to change its course offerings.

We want to continue to build the strong support at the county and definitely State level, which will help us eventually out in the schools.

In other words, was there a need? There is a need and there is a continuing need.

Thank you.

[The prepared statement follows:]

STATEMENT OF THOMAS W. HEINEMAN, COORDINATOR, INSTRUCTIONAL MATERIALS CENTER, LIVERMORE VALLEY JOINT UNIFIED SCHOOL DISTRICT

It is up to all of us—educators, legislators, and computer industry representatives to develop a nationwide partnership in education.

The goal of this partnership would be to provide our nations' children with the educational background which will allow them to realize their full potential as participating and productive members of our society.

Last year, the State of California passed legislation which offered state tax deductions to companies which donated computer hardware to California schools. As a result of this legislation, the Apple Computer Corporation provided one(1) computer, monitor, disk drive and some software to virtually all schools in the State of California.

This legislation has brought a minimum level of technological equipment and educational opportunity to the state's teachers and students. This situation has provided a base for some schools and districts to begin serious dialogue around curriculum (computer) and training in the use and application of computers for students. Other districts and schools had already begun the process of developing district computer curriculum and the acquisition of computers for classroom and laboratory use.

This single year plan was a beginning. However, there seems to be a persistent misconception about computers that many are guilty of perpetuating. That misconception is that schools just need to receive high technology equipment and all of the problems will be solved. A careful review of successful programs where computers are being used indicates that three(3) elements are necessary for successful implementation of new programs:

1. An inservice program for teachers which provides hands-on experiences followed by continuing training over more than one year.
2. A current and on-going review process of courseware and the ability to examine the programs.
3. And finally, the important support of providing the environment and necessary computer equipment which allows the instructor to open a whole new world of opportunity and knowledge to our students.

Based upon this knowledge and experience, our school district is suggesting that a federal program (legislation) be designed which encourages this Partnership of Education.

The legislation should encourage: At least a 2-3 year commitment of support for school districts. This would be evidenced by a continuing financial support for the acquisition of new technological equipment by schools.

The school districts today, as opposed to last year, are in various stages of implementing computer education. Because of this, we are recommending that schools be able to apply for specific high technology equipment that would assist them in reaching their identified goals. One district may be in need of computers while another may be at a stage of program implementation where they need various peripheral equipment of software.

The 2-3 year commitment would encourage school districts to see an on-going relationship and support this financial catalyst with their own discretionary funds.

Prior to the "Apple" bill, the State of California established regional Teacher Education and Computer Centers (TECC). One of their functions has been to provide computer inservice education. Last year, the TEC Center in Region 6, which serves Alameda and Contra Costa counties trained over 2,500 educators. This training prepared educators to, primarily, use either Apple or Commodore computer equipment. Already this year, the TEC Center, which serves our area, has received an increase in requests for training on Apple computers and software such as Apple Logo, by 70 percent. This situation leads into the second area that legislation should attend to.

This is a program of continuing inservice education. In this case, a district would identify educators who should be trained and paid for by industry. This could be during the summer or by providing funds for substitutes. They in turn would return to their districts and schools to carry out their classroom programs and serve as trainers and models for other teachers in their districts. We have recently implemented such a program with the Lawrence Livermore National Laboratory when two instructors worked as summer interns and subsequently returned to our district.

Finally, the understanding that learning is a never-ending path. This realization requires that the State or County programs work together to support and provide for on-going educational programs for those who provide the leadership and educational directions offered to our students.

Chairman Stark. Thank you very much, Tom.

I want to thank the panel for taking the time out on their holiday to come here and share their experience with us.

Our final panel is comprised of Michael Schuetz, the co-chair of the Committee on Computer Technology and Education of the California Federation of Teachers; Del Weber, secretary-treasurer of the California Teachers Association; Louis Goins, the principal of the Baden High School of South San Francisco; and Ms. Fern Burch, the staff member of the Lawrence Hall of Science at the University of California at Berkeley.

Unless any of you have any prearranged plans for how you would like to present your testimony, I will just call on you in the order in which you appear on the witness list. That would be Michael Schuetz first.

I did want to ask this. It occurred to me while I have been sitting here and some of you may be able to enlighten me. When we talk about software and those donations and seeing that everybody has adequate software, and I am showing my ignorance of our State system, but don't we still in California have a big textbook system where at least the public schools get all of their textbooks and they are printed by a State printing office? Is that program still in effect? Yes.

Is there any reason that that wouldn't be an equally efficient or inefficient way, or at least a parallel system of distributing software if indeed, the——

Mr. Weber. There is a reason and when it gets to my turn——

Chairman Stark. Somebody is going to address that, OK, that is wonderful. I will let Michael Schuetz begin.

Your statements will all appear in the record in their entirety and if you want to summarize or expand on them, why, feel free to do so.

STATEMENT OF MICHAEL D. SCHUETZ, CO-CHAIR, COMMITTEE ON COMPUTER TECHNOLOGY AND EDUCATION, CALIFORNIA FEDERATION OF TEACHERS

Mr. Schuetz. Thank you, Mr. Chairman.

I am here today as a representative of the CFT. I should also like to point out that I still am in the classroom and about 80 percent of my time is devoted to teaching computer science and computer awareness at the high school. I am also chairing the Marin County Computer Consortium. So I hope to bring a few points in from perspectives other than those necessarily of CFT.

However, as an opening remark, I would simply like to say that the California Federation of Teachers certainly welcomes all efforts to introduce computers and related technology into our schools. We see that as a very positive move and as Bobby Goodson pointed out, I would like to reiterate that certainly teachers have been at the forefront of this move for technology into the schools.

So aside from saying that we do support your bill, and we certainly do, there are some reservations, some points, many of which have been brought up by other speakers, but I would like to make a few expansions on those points.

First of all, we are very concerned about the issue of equitable access to computer technology by all segments of our population. Tax incentives in and of themselves certainly don't guarantee that a rural school in northern California is going to receive the same consideration, the same opportunities for their students as a school in a metropolitan, high-tech area.

I understand the constraints that your committee is operating under in terms of writing tax legislation which addresses some very complex issues.

Chairman STARK. That is one of reasons initially that we had designed the first bill to say that there would be one unit per school, recognizing that wouldn't be adequate, but that it would see that each school got the same amount of equipment.

The hope was that while this was—there were only a couple of manufacturers who expressed interest in the beginning, that the program would encourage others. Now that gives you the situation where a school ends up with five different computers if they are going to get five, but it seemed the only way we could think of to force the distribution broadly. We are certainly looking for other ways to do it, but that was one that we found.

Mr. SCHUETZ. Well, it is really very easy to sit here and say, "This is what you should do," and not necessarily have a solution in mind. Getting one computer or two computers into all the schools is a very positive step. It is the so-called seed step, because we understand, as many people have pointed out, that getting teachers and staff interested and aware of the potential of computers is absolutely essential.

At that particular point, certainly there is a real incentive for planning for the effective use of computers. I don't think a tax incentive bill is necessarily going to deal with the training issue which is so crucial, but certainly I think some provision could be written into that bill which says something to the effect that manufacturers of computer equipment that are applying for tax credits must certainly, as a requirement, ask for some indication by those requesting equipment that there has been some effort to plan for their eventual and effective use. I don't think that is a unreasonable kind of thing to ask for.

I understand that monitoring such a provision is difficult but in effect, manufacturers, I think, have a great deal of incentive other than the tax one to donate equipment to schools. We certainly see the secondary market as a real factor.

From personal experience, I can say that probably—and I am in a high-wealth area, Marin County, so this may not be typical, but in the classes where I have introduced computers of a certain brand to students, there has been almost a one-to-one correlation between that brand of computer and the computers purchased by those students, and about 20 percent of the students have purchased computers——

Chairman STARK. I think the computer companies would be the first to say—just like the company that provides the trumpet to the band at a low cost in the hope that incipient Harry Jameses will buy the same model later on to practice at home, I am sure that they are aware of that and I don't think anybody is trying to kid anybody that that is the major part of the benefit that they will get back.

Mr. SCHUETZ. I guess what I am trying to say is that a restriction that forces the manufacturers to really go a little bit out of their way in terms of monitoring their distribution programs at some cost to the manufacturers is not unreasonable because the incentive may be taking care of 75 percent of the cost and the secondary market is going to more than make up for any additional costs.

Lillian, I don't know if we are supposed to take questions from the audience but that is up to you.

Ms. HELLER. I just wanted to add at this point——

Chairman STARK. Sure.

Ms. HELLER. What the hell——

[Laughter.]

Ms. HELLER. We did, as I stated before, as a condition for the machines, work with individual teachers on the grants. A very interesting thing happened to me personally after school opened. About six or seven, and it happened about two a day, employees at Kaypro came to me and said they had been to parents' day; we had given machines there and they didn't know what to do with them. It was very easy for me to go to the file, pick out the grant proposal, say, "This is who is in charge, this is what they are planning to do, and this is what they should be doing."

In addition, we asked them to have tie lines and goals set so that at the end of the year when we get the feedback back, we really do have some little prodding interest and we like to keep people on track because there is really nothing worse for a parent to come in and work for us, to come in and see the machines not being used and nobody knows what is going on. So that—we did go that step, and it is costly to us, but it is worth it.

Mr. SCHUETZ. Well, you know, there is some negative aspect to giving computers to schools, also, and I have seen it in a number of school districts where I have worked as a consultant. They have purchased or received computers without a plan, without adequate training, and the consensus of the teachers and some of these students at the schools, because they fell on their face, was that computers were not what they wanted.

They weren't prepared for them. They wrote off the whole potential because it didn't work when the equipment came. I think that is really tragic and that is something we really want to avoid at all costs.

In terms of software, courseware, I would hope that the committee can find some formula by which we can offer the manufacturers, and distributors of software an incentive to provide schools with software. It is often the case that getting computers into the classroom where they can really help students learn, as opposed to learning about computers, involves software which may, in fact, cost the school district more than purchasing the hardware.

So I would hope that you give a lot of consideration to some such incentive, and I do understand your point about dumping software onto schools in order to decrease your tax liabilities certainly is a good one. I think in my written statement I point out that you would want, I think, to specify that software would have to be requested and desired by the school or I think everyone could decrease their tax load quite easily.

Thank you.

[The prepared statement follows:]

STATEMENT OF MICHAEL D. SCHUETZ, CO-CHAIR, COMMITTEE ON COMPUTER TECHNOLOGY AND EDUCATION, CALIFORNIA FEDERATION OF TEACHERS

The following written testimony with respect to the proposed Federal law, H.R. 701, "The Computer Contribution Act of 1983", is hereby submitted to the Subcommittee on Select Revenue Measures, Committee on Ways and Means, U.S. House of Representatives on behalf of the California Federation of Teachers.

The California Federation of Teachers would like to take this opportunity to express, through the testimony of its representative, its general support for the proposed Federal law, H.R. 701. This position of support is based upon our experience with similar California legislation and is consistent with recently adopted CFT policy which states in part:

"California Federation of Teachers applauds and welcomes the introduction of computers into the schools of California. Because computer literacy is a basic skill which should be available to every student, CFT is committed to promoting equity of access to computers for all students regardless of sex, race, or socio-economic status. The introduction of computer technology into our school system should augment and compliment present as well as future curriculum."

It is our observation that tax incentives do indeed dramatically increase the donation by manufacturers of computers and related equipment to schools. Furthermore, it seems apparent that without these incentives or other support the introduction of computers into our schools will continue to be a slow, sporadic process. We feel strongly that legislation such as H.R. 701 can significantly enhance the abilities of our schools to help students become aware of the appropriate uses and roles of computers in our society as well as helping to apply technology to assist in the learning process. However, it is absolutely crucial that legislation extending tax incentives for the donation of computer equipment be written in such a way as to encourage donations on an equitable basis.

In California we have seen donation programs on the part of several manufacturers which fail to address the issue of equity of access to technology for all students. Also, in some cases, donation programs have distributed computers to schools or school districts which were not prepared to take advantage of such gifts. By this we mean that there was no plan for efficiently utilizing the equipment to better the children's education or there was insufficient numbers of trained or interested staff to implement existing plans. Also there was often insufficient resources to maintain equipment or purchase necessary software. In order to avoid these negative aspects we would make the following recommendations:

(1) That donation programs qualifying for special tax incentives show evidence of positive steps taken to encourage a distribution of equipment which does not discriminate against any geographic areas or socio-economic group.

(2) That donations of substantial numbers of computers or computer systems to a single school or school district qualifying for special tax incentives only if the recipient school or district has developed a comprehensive plan for the sound educational use of such equipment.

(3) That educational software specifically requested by a school or school district be included as a qualifying donation under the proposed special deduction rule.

(4) That donations of technical assistance and maintenance also qualify under the special deduction rule.

It should be pointed out that although the California legislation similar to H.R. 701 did not specifically incorporate the above four stipulations, its overall effect has been a positive one. Already, as a result of this legislation, additional thousands of California school children are learning about computers and using computers to learn. Legislation on the Federal level which incorporates the above four points should have an even more dramatic and positive impact on the nation's schools.

Chairman STARK. Thank you, thank you very much.

Mr. Weber, from CTA.

STATEMENT OF DEL A. WEBER, SECRETARY-TREASURER, CALIFORNIA TEACHERS ASSOCIATION

Mr. Weber. There is both an advantage and a disadvantage to coming late on the agenda. Most of the good points that needed to be made have been made, but it gives me the opportunity to reemphasize a few things.

I am not going to cover the prepared statement because I think everything in the prepared statement has been covered at least 25 times in what I have been listening to this morning. There are some side points, however, that I would like to cover.

In California—well, just for the record to start with, California Teachers Association is in support of this bill. As happens so often in States versus Federal agencies, we are also part of a national affiliate which we have not yet brought fully aboard. You are bringing the Federal Government in and we are bringing a national affiliate along at the same time.

The problem is simply lack of experience on the Federal level in both cases. [Laughter.]

But we expect to work with those folks and show them what we have been able to do in California.

For the record, I am a classroom teacher. I have a teaching partner supported by the association at Anaheim High School, where I teach computer science and mathematics. I also teach part-time at Santa Ana College. I am a moonlighter in computer science and have been for more years than some of the folks in here will want to hear about because you weren't around when I started.

The role reversal is kind of interesting. In California, we work together and this is one of those rare organizational things. Mike and I have been working together for, what, a couple of years in the schools and computer group; we worked together in helping get the original Imbrecht Act passed. That was something the two organizations saw eye-to-eye on and we have been working on its implementation. We think it has been a tremendous success.

We think we learned some things that we need to reiterate and reemphasize as it is applied on the Federal level. Of course, on the Federal level, they started out with their grants of equipment to the colleges and now they are talking about doing it to K–12, which is where I think it should have started.

In California, we started it out with K–12 and we followed it up with a college bill, which mirrored what was done in the K–12 last year. This year, we are studying how to implement it for the college level.

I point out with regard to teacher training, everybody has hit it over the head; I have to again, organizationally and personally.

Last year, this current school year, we needed 1,100 new teachers in math and science. Our total State college and university school system graduated 23 for the public schools. Now, you extrapolate that and I think you can see what is happening to the education of the future of the country. I recognize the fact that we are dealing with the Tax Code here today, but I don't think the Tax Code can be dealt with in a vacuum without the issue of teacher training being paramount.

The fact is, we are dealing, not with final solutions, but with seed projects. That is what we dealt with with the computers in schools; that is what we dealt with with the Imbrecht Act; that is what Apple dealt with—"Kids Can't Wait," every school has a computer.

In Anaheim High School, we achieved a computer lab, used across the spectrum of all of the subjects in very much the same way. We started with a couple of seed teachers. One of us had an Apple and one of us had a Heathkit machine and we would let a few kids experiment.

The next year, we started letting a few teachers experiment. Then we started having a few faculty meetings. Why can't we have computers that the English teachers can use—they even can be used in music, believe it or not; that the reading teachers can use, et cetera?

Lo and behold, we looked around one day, the whole faculty had been in on a planning session. Anaheim High School now has a 70-station computer lab. It kind of bit us when we got to this equity question when the computer donating came into the play because they said, "Well, you already have so many computers, why do you want another one to be donated."

We said, "Hey, wait, let's get into the equity from the reverse standpoint. We still want our Apple, even though we have already got 35 of them, we still want our free Apple." [Laughter.]

And we got it.

The whole thing has to be approached from the standpoint of the teachers—you know, there have been eight major studies released, or about to be released, within the last year on the American educational system. They all come at it from a different point of view. I think I have most of them memorized at this point because they have been beaten into my head as I go around the State to various meetings of various kinds, but there is a common thread that runs through all major reports.

The solutions to whatever educational problems are perceived and the reports are by no means together on what those problems are, but the common solution that they have all come up with is that the teachers now in the schools are the solution. They are not the problem; they are the solution, and it is in those teachers that the solutions to those problems will come.

If you want computer education in the schools across the spectrum of the curriculum, it is the current teachers on-site that are going to meet that problem and you are going to have to get them over the computer phobia to start with and then you are going to have to train them. I don't know as any tax incentive computer donation or whatever is going to work unless that is addressed, perhaps not in this piece of legislation, but in some kind of accompanying legislation.

I understand that the Federal Government has its own bureaucracy just like the schools do. You have to consider taxes here and you have to consider implementation there, and you have to consider something else somewhere else. Congressman, you only have a piece of the action, but you also have a vote in the full House and you are not without influence, as we have known from working with you for years. You are not without influence in other areas of the House of Representatives.

The subject of textbooks was raised—we have discussions as to what we should do at the State printing plant—I have different recommendations on that on different days of the week myself—which prints textbooks which committees of teachers have selected as being the primary textbook to use in grades K–8. We haven't inflicted—and I use that word deliberately—we haven't inflicted mandatory textbook selection on the secondary schools as yet and I hope that we don't reach that stage soon.

I would like to give a statistic that will bear interest. We did a survey in software and we discovered that for just the Radio Shack computers—I don't want to talk about any one brand name too exclusively—I should also mention that Kaypro gave us a computer for us to try out for 6 months and do an analysis. We found it very useful in a whole lot of ways and you got our detailed analysis back and it was appreciated. But for the Radio Shack computers, there are over 1 million pieces of software on various markets. Everywhere from that which is sold by Radio Shack to that which is sold in the ancillary markets out there, magazines which tout Radio Shack products which have no connection with Radio Shack. There were over 1 million.

Do you have any comprehension of what it would take in terms of people time if we just said, "Sit down and evaluate all the Radio Shack software"? Think about it. One million pieces. It is an almost incomprehensible task.

What we have found is that teachers in the classroom are going to know what is good and they are going to know what works and they are going to know it very fast. If a teacher in a classroom who wants his or her youngsters to succeed well on tests and to do well, selects a piece of software, that software is going to work. I don't care how many committees you appoint at what level, the further you get those committees away from the classroom teacher, who is the on-the-job practitioner, the less effective and the less relevant they are going to be.

I think that about sums up—there is one thing I want to hit which has been hit from two ways: when you get into the tax credit thing, I would definitely like to see a limitation on the time of the bill. I would like to see it sunsetted, and that is the organization's strong position.

We sunsetted it within California; we did not permit a bureaucracy to grow up around it. I know that the manufacturers would like the tax incentives to go on forever, but you are talking about something that needs to be seeded. You are not talking about something that needs to acquire its own long-term bureaucracy.

Now, we may, as a result of our original studies, come up with a long-range plan for tax incentives, but I wouldn't like to see that built in in the beginning.

One of the things we worry about is that if you didn't sunset it, it would become just one more obstacle to some real solution for the question of school finance, which has not yet been settled to anybody's satisfaction and is not likely to be soon. Tax incentives or tax rebates, tax credits of any kind can get in the way and muddy that picture tremendously.

The second concern we have is equitable distribution. We have no objection to the bill based on this. We support it in California. I think eventually the National Education Association will also support it. We are working on that. The question of equitable distribution has been raised and reraised and re-reraised here this morning. I have learned some things that even I wasn't aware of and I thought I pretty well knew what was going on in most school districts in California, but all types and sizes of school systems have got to be covered with computers because I don't care whether you are talking about the backlands of West Virginia—my deceased first wife came from West Virginia, and if you got into some discussions about the backwoods of West Virginia, you didn't live a very long and happy life in my particular household at that time. [Laughter.]

But those youngsters are going to be living in a society which uses computers at the corner grocery store just as much as the youngsters from the urbanized areas, such as Anaheim or wherever. So the effort must be toward equity across-the-board and getting computers into the inner-city schools so that youngsters have a chance to become upwardly mobile. All of those points have been hit.

I originally had a long outline and was going to give a real spellbinding speech, but the hour grows late and the spellbinding speeches have already been made, so I think with those highlights, I will close.

[The prepared statement follows:]

STATEMENT OF DEL A. WEBER, SECRETARY-TREASURER, CALIFORNIA TEACHERS ASSOCIATION

Preliminary Statement

This preliminary statement is presented in two areas of concern:

(a) The specific measure before the Committee, i.e., tax credits for donations of computer equipment to the schools; and

(b) The role of computers in education and social change in general.

1. Tax Credits for Donations of Computer Equipment

The utilization of computer equipment in the classroom can not be considered in a vacuum without having it a part of an overall educational program regarding computers.

Any solid educational program introducing computers into the schools has three very discrete and independently significant aspects:

(1) Teachers must be adequately trained to understand the problems and the potentials of the use of computers.

(2) Accompanying educational software must be sound and acceptable for use in the curriculum.

(3) Once the above two requirements are met, the problem of obtaining the appropriate computer equipment can be validly addressed within a solid frame work.

The following brief comments are offered for each of the three stated areas:

1.1. TEACHER TRAINING

Computers are a relatively recent phenomenon, which already have had, and are expected to continue to have, vast impact upon the daily lives of the enire society. They are also unusual and unique on the educational scene, in the that the teachers and the students are learning about them within approximately the same historical time span.

There have been within recent months, releases of no less than eight major studies of the American educational system. While they draw different conclusions as to the nature of the perceived problems and solutions suggested, one common thread is evident: for whatever problems extist in our educational system, the teachers already employed in the schools are part of the solution and not the problem.

Within California, our experiences with the regional Teachers Education Computer Centers have shown that teachers can, do and will give of themselves and their time to upgrade their knowledge and skills in the service of our society. They can, do and will provide the driving force to make changes in curriculum needed to provide for the futures of the students in their care. All they have ever asked is that the opportunities for training be made available to them in such a manner that they are not asked to subsidize it from their personal family and household budgets.

Experienced and properly trained teachers will bring about the changes needed to adapt to the so-called "information age." Without this primary ingredient, no amount of legislation or mountains of technical equipment will be effective.

1.2. EDUCATIONAL SOFTWARE

There is to be found today, on the shelves of computer software stores up and down the land, an unbelievable number of software programs designed to teach virtually any subject in the curriculum.

Most of it has not been prepared by practitioners in the classroom. And, as a predictable result, much or most of it is junk.

Teachers can, do and will write computer software which is and will continue to be useful in helping students to learn, once those teachers have the ancillary skills needed to deal with computers.

Teachers can, do and will competently evaluate the software written by others, to determine its suitability and usefulness in helping students learn any given subject. To do this, it is not even necessary that the teachers have the computer-oriented skills necessary to write software of their own.

There is, of course, a difference between teaching about computers, and teaching through the use of computers. But the underling principle remains: those who are of proven teaching competence are the best source of educational materials, as well as the best evaluators of educational materials written by others.

1.3. TAX CREDITS FOR EQUIPMENT DONATIONS

We are somewhat more ambivalent regarding the topic of tax credits for equipment donations. Within California, we have participated in the implementation of legislation which accomplished massive equipment acquisitions, and, on the whole, have found it to be a worthwhile and productive experiment. The initial Imbrecht Act, which provided for donations for K–12, had a sunset clause after one year, as did the follow-up act which provided for tax credits for donations at the college level.

This limited time of effectiveness made to the project relatively easy to support. It was obvious that the project provided for the seeding within the educational system of something generally recognized as beneficial, even necessary. The time limitation made it possible to stay away from the questions of conflicts over whether or not this would aggravate, rather than resolve, the long-range solutions needed for school finance.

We would have similar concerns on an equivalent federal bill.

Some still unanswered questions which await further statistics relate to the equitability of distribution among high-versus low-wealth districts, as well as the follow-up use across the broad spectrum of school districts.

If federal tax credit legislation is enacted, we believe, to be most beneficial, it should provide:

(a) A limited period for the donations, so that it does not become one more obstacle to a real solution for school finance.

(b) Equitable distribution of equipment covering all types and sizes of school systems.

Raising the question of computer education and related methods of acquisition of equipment automatically raises some broader questions of public policy on the role of computers and technological education in a complex society. The second part of this statement addresses those concerns.

2. Computers, Education and Social Change

As a full-time high school teacher, and a part-time community college instructor, in the areas of mathematics and computer science, the author's most vital interests have been in the entire general area of technological education for a period in excess of thirty years. During that time, I have seen, and been a personal part of, the evolution form huge, individualistic computer behomeths requiring a cadre of pioneers, to a situation where most housewives are considering computer purchases as casually as selecting the kind of stew to be made from leftovers.

Additionally, I have been fortunate enough to have had diverse and larger-scale business experiences, from running a military payroll operation to being the Treasurer of a nonprofit corporation for the past several years which has an annual budget in excess of twenty-five million dollars.

In the latter capacity, the author has had major policy responsibilities in the areas of accounting, membership records and enrollments, word processing, and data processing in general. From this, much has been learned about the business uses of computers at all levels from central headquarters "library" functions to statewide officers of various sizes using standalone desktop computers.

As a result of all of these overlapping areas of experience and concern, I have repeatedly been asked to serve, and have served, as a representative to a variety of overlapping business, professional and/or educational groups concerned with technological (i.e., computer) education.

In California, this included being a working representative from the Association to the "Computers in Schools" Task Force, meeting with representatives of business and industry of virtually every level of management and technical expertise, as well as a cross-section of the educational community.

2.1. EXPECTATIONS VERSUS REALITIES

Wearing all of these hats at once, I most respectfully offer here some comments on what can most simply be referred to as the "high tech" educational needs of our society. Hopefully, these comments may be of some value in regaining some perspective on this topic for all of us.

In many ways, high-tech has become our latest white knight. Pundits are looking to it as the source of the creation of many new jobs, as well as our national hope for restoration of our supremacy abroad. Opinion makers from politicians to newspaper editorialists predict that high-tech will give us the strength to upgrade the skills of the general American worker and increase their satisfaction with their jobs.

My belief is that all of this is putting us in the unique position of being about to hit the nail squarely on the thumb.

2.1.1. Possibility of backlash

Even worse, it is likely that, if the topic of high-tech continues to be treated as a cure-all, then, when the bandwagon crashes, the entire society will deal the use of computers a massive backhanded blow which will retard our progress over the long run.

Culturally, we have frequently demonstrated a tendency to get carried away with short term panaceas, for which we have repeatedly paid a heavy price when disillusionment sets in. This has frequently resulted in an inability to achieve our fullest measure of progress, because of the fits and starts caused by bandwagons and their backlash.

2.1.2. Magical powers ascribed by the unwary

As a culture, we have begun to invest the computer with magical powers which it simply does not possess. An excited press would have us believe that the computer is the intellectual equivalent of the anabolic steroid, destined to turn 6-year-olds into olympians of competency testing.

Unfortunately, those writing such articles too often exhibit only the most shallow understanding of computers specifically, and the high-tech education picture in general.

2.1.3. Reaction can undo progress

The results of all this, based on the past, are most likely to be a totally unnecessary strong reaction within a few years against the exaggerated claims for computing and word-processing.

To repeat: these claims are not being made by those who understand computers. They are being made by those who do not understand them.

It will soon be noticed that networking, improperly done, only disconnects human beings. Following this, there will be calls from the disillusioned to remove the monsters from the school as a type of penance for their being oversold in the first place.

No doubt, if our past history is an indication, someone will eventually discover it written in scriptures somewhere that the devil lives in a floppy disk drive, and the cycle will be complete.

After that, it will take a period of time before we are able once more to approach the topic with some perspective.

This paints the worst possible scenario. It is also possible that this will not happen, and that cooler heads will prevail in the beginning.

But we have some reason for concern.

2.2. THE QUESTION IS THE MOTIVE

There is no quarrel whatsoever with the idea that computer literacy must be a common goal for our entire society, and that we can and must exert the energies to obtain and deploy the resources to do the job. Many of the measures now being taken are overdue. But the motives are what are in question, because they seem to be based on two questionable assumptions:

(1) Predictions are being made that future job growth in the United States will favor high-tech jobs, particularly in computer-related areas.

(2) The bulk of the population must become or expected to become computer experts at a high level of expertise.

My personal belief is that these two general premises stated above are simply faulty.

2.2.1. Job opportunities: Actualities

The first stated premise is faulty because of the misuse of statistics. We will be employing on the order of 200,000 people in new high-tech jobs over the next few years; during that same period of time, however, we will need a total of 26,000,000 new jobs in all. This means that high-tech will provide less than one percent of the total new jobs. Even though those high-tech jobs will have an impact on our social structure far beyond their number, the bulk of new jobs for the general population will come in other areas.

2.2.2. Levels of expertise: Actualities

The second premise is faulty because, although it is correct that high-tech will be a part of the everyday person's environment, this does not automatically mean that there will be a high level of expertise required for everyone, or even for the major part of the population.

The case can actually be made that the reverse is true. Instead of a larger number of highly trained specialists, we will require a smaller number of them, for reasons set forth below.

2.3. GENERAL EDUCATION NEEDS

The bulk of our population will need to have stronger general education requirements, in which high-tech takes its place along with reading and computational skills, as well as studies in ethics, social systems, and the needs of a democratic society in general.

In other words, while we need to recognize the needs of intensive skill development for the relatively few high-tech specialists, we can not lose sight of the needs of the large bulk of our population, now students, who will not be high-tech specialists, but whose lives will be affected by living in a high-tech society.

For a typical employer, the largest percentage of employees are engaged in clerical and service occupations. A smaller number are employed as professional positions. A much smaller number are employed as high-tech experts, and an even smaller number as managers and executives.

If it is true, as generally predicted, that clerical and service occupations will account for 40 percent of the total employment growth in the 1980's, then our problem is one of adding computer usuage to the general education of all the students, along with the specialized high-tech education of a relative few. It is not, as some suggest, the problem of somehow making the bulk of our future citizens into highly skilled computer programmers and/or engineers. At best, this would be impractical, given the broad range of diversity in human skills and aptitudes. At worst, attempting to do this could be downright disastrous.

No one disputes that high-tech will have a profound effect on nearly every American job in the future. Secretaries are now swapping their typewriters for word-processing equipment. Bookkeepers are trading their ledgers in on computerized financial spread sheets. Purchase and inventory systems are computerized. The neighborhood automobile mechanic uses computers to diagnose what is wrong with the engines of our cars. Telephone equipment in general is being computerized—what few human operators remain now use computerized telephone directories.

But the use of these new technologies in some cases spreads the gap, rather than levels it, among the needs of people. A relative few will be needed to analyze and design systems for the relative many to use with increased ease.

2.4. HISTORICAL EFFECTS OF HIGH-TECH

Historically, as high-tech comes into a culture (computers did not begin this process, they are merely the most recent arrival to it), the skill requirements for jobs first increases and then, as mechanization grows, actually decreases sharply.

In the long run, high-tech machinery requires generally less operator skill, not more.

We can take as an example the question of printing, something which should be familiar in a highly literate society which consumes an immense amount of printed material. Typesetting, layout, and photo-engraving have, in the past, required a high degree of personal skills, Now, with high-tech, most of these operations are being done by machines.

2.4.1. Computers as a part of high-tech

Computers. the very heart of the high-tech revolution, are a classic example of this phenomenon. Early computers were not only large and expensive but they required extremely high qualified programmers and operators who could be depended on to be quite individualistic. In the early days, there were not many computers, and a "high-priesthood" of sorts developed with its own mystique. Each computer was different. Each had its own "dungeons and dragons" keepers of the occult mysteries and secrets which permitted its use.

Now, computers are so numerous they are being sold at drug stores and variety stores. They have also become more standardized. The market has forced them to become "user-friendly." The level of skills needed to operate them on a daily basis is declining rapidly.

2.4.2. Actual effects on average office workers

Office workers in general now use computers for a wide variety of repetitive tasks without any knowledge whatsoever of computer languages or programming. Word processors can correct typing errors quickly and automatically. Electronic dictionaries check spelling (although without being able to distinguish among the valid choice of usage of words such as "their," "there" and/or "they're"). Letter-perfect typing and strong spelling skills are no longer as important as the ability to use good judgment.

2.5. THE POTENTIAL AND THE PROMISE

High-tech can now be used to enhance the quality of working life. Managers and workers can and should meet regularly on how high-tech can be applied to give people a greater sense of responsibility. This is the potential and the promise.

How is that promise being shown in actual impact day?

Contrary to the "what could be" there are danger signs already evident that not all is going well with major portions of humanity with the introduction of high-tech.

Admittedly, some executives, programmers and engineers are stimulated by their jobs. But most people working in high-tech environments are employed as office workers, assembly workers, and low-level technicians, where there is very little intellectual challenge.

A recent survey of a major high-tech industrial center here in California found that a third of all workers take drugs and drink on the job; it was further estimated that this third of all employees was largely responsible for thefts on the job as well as industrial accidents.

This should cause all of us to sit back and take a closer look at what the realities are going to be if we are not careful, as opposed to what they could be. Bringing about the optimum is not going to be automatic.

One major thing which is new with the new high-tech revolution which is, as yet, only dimly undertstood: where, in the past, technological advances primarily displaced physical labor by the use of machines which could do physically repetitive tasks, the current high-tech computer revolution may well displace a great deal of repetitive mental labor. Entire classes of the skilled or semi-skilled face the potential of being made obsolete by sophisticated computer software packages designed by a small number of bright technocrats.

2.6. IMPLICATIONS FOR EDUCATION AND OUR FUTURE

The implication of all of this for the education of our future citizens has, I think, been misunderstood if it has been thought of at all. Our general societal response, caught up as we are in the possibilities, may well be out of focus or misdirected.

The simple truth is that overemphasis on highly specialized individual computer skills for everyone will not prepare our country or its citizens for our actual future.

Employers always have preferred, and can be depended upon to continue in the future to prefer, employees with a thorough general education and good work habits to those with narrow vocational skills who are unable to function outside their limited area of expertise. The foundation for that thorough generl education and those good work habits are the basic task and strength of the schools, working in partnership with the home, just as has always been the case.

Good study habits, along with deep personal respect for other people, dedication to the common good of society—these are the qualities which a good general education can provide. Without them, no system of high-tech can survive.

To rephrase it another way: the best possible preparation for our students, so they can adapt to high-tech changes as they will occur at an ever accelerating rate, is going to be a strong general education, including a knowledger of different political, economic, social and cultural systems as well as strong analytical, communicative, and computational skills.

This approach will also enable our people to meet the needs of a democratic society. Our system, in order to work properly, requires that all citizens be qualified to understand the major issues of the day, discuss them, and be able to vote and act on them.

This means that there is no teacher in any classroom in any subject anywhere who is not a very important part of preparing our people to live and work in a high-tech society. Getting this message across, without in any way appearing to want to retard the progress being made in high-tech, is, it seems to me, one of the major issues facing us all. In fact, if we do not, as a culture, understand this, high-tech will not only fail to do the things it is potential of doing for us, our society could itself be placed in jeopardy.

2.7. SUMMARY AND CLOSE

For the few, high-tech will be the center of their personal existence at a high degree of specialized skill. For them, it will be the focal point through which they can be creative for the entire society. This will, to at least some degree, affect the lives of all of us.

But, for most people, high-tech becomes only one more general aspect of their lives, to be included in their general education about social systems, ethics, logic and reasoning.

Probably almost no one in tomorrow's society will be untouched by some effects of high-tech. But for most, it will not be the center part of their personal lives.

We can and should meet the needs of the relatively few high-tech specialists.

But we must also meet the other needs of all of our citizens.

There is no reason that I know of that we should think for one moment these these should be exclusive of one another.

Chairman Stark. Del, thank you. I, too, have spellbinding speeches and I often remind that Hubert Humphrey indicated that it was a great 15-minute speech and if I could learn to deliver it in less than an hour, I would have a great career in politics. [Laughter.]

Our next witness is Louis Goins, the principal of Baden High School in South San Francisco.

STATEMENT OF LOUIS J. GOINS, PRINCIPAL, BADEN HIGH SCHOOL, SOUTH SAN FRANCISCO

Mr. Goins. Thank you, Mr. Chairman.

My name is Louis J. Goins and I am the principal of Baden High School in South San Francisco. I want to express my strong support for the Computer Contribution Act of 1983.

Today, we have heard from the students and we have heard from the teachers. We have heard from the teacher organizations. Now I am going to give you a principal's perspective, the person in the middle who can make it work.

School districts like mine, the South San Francisco Unified School District, are faced with enormous changes in our instructional methodology brought about by this rapid transition into the new informational society. I think that the preparation that we provide our youth in computer literacy during the next few years is going to carry way into the next century. This is challenging to us as principals and I hope it will be a challenging responsibility of our Federal Government.

Many of us in the field today have seen educational innovations come and go, but the facts are there to indicate that computers in education is not just another gimmick.

In a recent school study across the Nation, it was reported that 24 States now recommend or require computer courses for students, and 16 States have or are considering some kind of computer literacy requirements for teacher certification.

In another survey released just last month in the 15th annual Gallop poll of public's attitude toward public schools, almost 75 percent of those surveyed responded that computer training should be offered in the school. This survey also states that the public demands for computer training has nearly doubled in the last 2 years and that 8 out of 10 parents whose students are in schools who do not have computers would like to have computers for their children.

As principals, we know a significant number of our students are learning how to use computers and bringing this skill into the classroom at a much younger age. We also know that the business community, along with higher education, needs computer-literate high school graduates who will be able to function effectively in today's society.

I believe with the passage of 701, it will create an exciting bond between schools, community and business. I would like to describe for you how the one-personal-computer donation program in California, which you have already heard about, has assisted our school district. Each of the 17 schools in our district, 11 elementary, 3 junior high, and 3 high schools, received the donated personal computers, as described for you earlier by Mrs. Bowen.

If our district was to pay for these computers, the cost would be approximately $2,300 per school. One of the problems that is always mentioned by principals and teachers in developing computer programs in their schools is the lack of funds to purchase the computer or the accompanying software.

At our elementary level, the donated computers are used to familiarize students with the technology of computer-assisted instruction in language arts, mathematics, problem-solving, which is a part, or will be a part of their lives. At one of our junior high schools, students are articulating through computer science and computer literacy classes and moving into higher sophisticated knowledges of computer programming.

Our district is now engaged with the San Mateo Community College to formulate a cooperative plan to articulate curriculum and staff development in math, science and technology, all the way from junior high school through the second year of college.

Principals in our district, like principals throughout the country, believe that more students are using computers, that students using computers are more motivated toward learning, that special education students are making remarkable progress with the use of computers, that alternative schools, like the one that I am in, students are becoming turned on with the use of computers and that student achievement by using remedial computer programs as a supplement to the regular program is accelerated.

In conclusion, I believe that we must have Federal support for computers in education to insure the retooling of our schools to keep up with today's technical society. The passage of H.R. 701 will move us a long ways toward this national goal. I urge the committee to give full support.

Thank you.

[The prepared statement follows:]

STATEMENT OF LOUIS J. GOINS, PRINCIPAL, BADEN HIGH SCHOOL, SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT

Mr. Chairman and distinguished members of this committee, my name is Louis J. Goins, and I am the principal of Baden High School in South San Francisco. I also am California's representative to the National Association of Secondary School Principals' Federal Relations Network. I want to express my strong support for "The Computer Contribution Act of 1983." (H.R. 701)

School districts like mine, the South San Francisco Unified, are faced with enormous changes in our instructional methodology brought about by our rapid transition into this new informational society. The preparation that we provide our youth in computer literacy during the next few years will carry over into the next century. This is challenging to us as principals, and it is hoped that it will be a challenging responsibility to our federal government.

Many of us in the field have seen educational innovations come and go, but the facts are there to indicate that use of computers in education is not just another gimmick. In a recent school study across the nation, it was reported that twenty-four states now recommend or require computer courses for students, and sixteen states have or are considering some computer literacy requirements for teacher certification.

In another survey released last month in the fifteenth annual Gallup Poll of the Public's attitude toward public schools, almost 75% of the respondents said computer training should be offered in the schools. This survey also states that the public demand for computer training has nearly doubled in the last two years and that eight out of ten parents whose students are in schools that do not have computers would like to have computer education for their children.

We know that a significant number of our students are learning how to use computers and are bringing this skill into the classroom at a younger age. We know that the business community, along with higher education, needs computer literate high school graduates who will be able to function effectively in today's society.

With the passage of "The Computer Contribution Act of 1983," I believe an exciting bond will be created between the federal government, business and our nation's schools by working together to meet the demands of our expanding technological society.

I would like to describe for you how one personal computer donation program for public and private schools in California has assisted the South San Francisco Unified School District.

Each of our 17 schools (11 elementary, three junior high and three senior high schools) received a donated personal computer, a monitor, a disk drive with software, and a kit of other materials such as a software directory, brochures on compute usage and a basic Programmer's Reference Manual. If our district were to pay for these items, the cost would be approximately $2300 per school. One of the problems mentioned by principals in developing computer programs for their schools is the lack of funds to purchase the computer and accompanying software.

At our elementary school level, the donated computers are used to familiarize students about the technology of computer assisted instruction in language areas, mathematics and problem solving which is, or will be, a part of their lives.

In one of our junior high schools, students are matriculating through our computer literacy/computer science classes and are moving from a basic familiarity to a higher sophisticated knowledge of computer programming.

In our district two senior high schools are working in conjuction with the San Mateo Community College District to formulate a cooperative plan to articulate curriculum and staff development with math, science and technology from junior high school through the second year of college.

Principals in our district, like principals throughout the country, believe that, (1) students using computers are more motivated towards learning, (2) special education students are making remarkable progress with computers, (3) alternative school students become "turned on" to computers, and (4) student achievement, by using remedial computer programs as a supplement to the regular program, is accelerated.

In conclusion, I believe we must have federal support for computers in education to insure that we are retooling our schools to keep up with today's technical society. The passage of H.R. 701 will move us a long way towards this national goal. I urge the committee to provide full support. I will be happy to answer any questions you may have.

Chairman **Stark**. Thank you very much, and saving the best for last, as we always do, Ms. Fern Burch, who is a staff member of the Lawrence Hall of Science at the University of California at Berkeley, will wrap up for us today.

STATEMENT OF FERN BURCH, STAFF MEMBER, LAWRENCE HALL OF SCIENCE, UNIVERSITY OF CALIFORNIA AT BERKELEY

Ms. **Burch**. The rapid infusion of computers into our educational system has raised many issues among educators, administrators and parents. While many question the usefulness of this equipment, recent research points to a number of beneficial effects. Let's examine some of the present classroom uses of computers and their educational value.

There are three reasons why we need to make computer access available to every American child. By 1990, 40 to 50 percent of all American workers will be making use of electronic terminal equipment and students must be prepared to fill these jobs. Second, the technological revolution is transforming business, science and communications, and the schools should not be left behind. Additionally, computer technology has an unlimited potential to upgrade our Nation's schools. We cannot afford to create an economic underclass of Americans whose schooling has denied them a part in the labor force of the computer age.

The educational applications of the new technology go far beyond priming the workers of the future. Computers are already helping to strengthen the quality of teaching in a number of curriculum areas. Students can interact with computers, either individually or in small groups and create a situation where hands-on experience becomes the dominant mode of instruction.

Such activities, where students are active participants, engender the most effective types of learning and the experiences which remain with students for the longest time. More specifically, computer interactions are helping to break barriers which have long prevented students from developing proficiency in such basic areas as mathematical problem-solving and writing.

In order to program a computer to solve a problem, the student must have a thorough understanding of the nature of the problem and of the processes of his or her own thinking. Educators have observed that children enjoy programing and the use of computers promotes both an improvement in problem-solving skills and a more positive attitude toward mathematics. Computers make the dynamic aspect of problem-solving an evident process. The immediate feedback and the clues that a computer provides become an interactive dialog that encourages the student to take further risks and to explore alternatives eventually culminating in solutions.

Word processing offers a means of easing many of the physical and, therefore, attitudinal barriers to writing. Many students view writing as a cumbersome, intimidating physical project. However, using a computer makes revision painless. Students tend to write longer compositions on computers and to revise them more. Additionally, the professional-looking manuscript enhances student pride in the finished product.

All of these activities are brought within the realm of a disabled student through use of a computer. Computers can be programed to perform complex tasks by responding to a single key stroke, or a speech-controlled interface. This allows students with special needs new channels of self-expression and communication which are not available through any other medium. Any task that a disabled individual can perform with the computer will decrease the ramifications of their disability and enhance their independence.

Computer access can change both the nature and the quality of the curriculum. Spreadsheet programs which are common in business can be used to conduct statistical analyses, prepare budgets, or model population growth. The use of computers to monitor data in the laboratory science classes would provide valuable training in their real-world use.

Simulations enable students to investigate topics previously inaccessible due to danger, expense or the magnitude of the task.

Interacting with speech synthesizers, a rather primitive form of advanced technology, will help students to see some of the limitations and problems involved in the development of new technology.

Computers provide active environments for learning, an opportunity to improve competence in basic skills, a tool which can bring students with special needs into the mainstream, and an opportunity to improve instruction in many curriculum areas.

Development in the computer field occurs at an explosive rate and the creative power of human minds continues to offer broader applications for business, science, communications, industry and the arts. At the same time, our power to extend the potential of children will continue to grow.

In view of these many contributions which computers can make in the classroom, I urge the Subcommittee on Select Revenue Measures of the Committee on Ways and Means to support the further development of computers as instructional aids and the installation of computers and computer training in our schools. I believe that science centers like the Lawrence Hall of Science in Berkeley are prepared to provide the necessary teacher training and help to develop the new curricula to support the use of computers. As recommended in the report of the National Commission on Excellence in Education, the Federal Government should provide leadership and financial support in these areas. I believe we should encourage the active participation of private industry through such measures as the Computer Contribution Act of 1983, House Resolution 701.

Thank you.

[The prepared statement follows:]

STATEMENT OF GLENN T. SEABORG, DIRECTOR OF THE LAWRENCE HALL OF SCIENCE, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF.

The rapid infusion of computers into our educational system has raised many issues among educators, administrators and parents. While many question the usefulness of this equipment, recent research points to a number of beneficial effects. Let's examine some of the present classroom uses of computers and their educational value.

There are three reasons why we need to make computer access available to every American child. Computers are quickly moving into all facets of the labor market and students must be prepared to fill these jobs. The technological revolution has already transformed American business, science and communications. It also has an unlimited potential to upgrade our nation's schools.

Just as the industrial revolution transformed a predominantly agrarian economy into one which centered around the production of goods and services, the computer is again altering the direction of our labor force. By 1990, economic forecasters at Arthur D. Little, Inc. predict that 40 to 50 percent of all American workers will be making use of electronic terminal equipment. This era of rapid social and economic change is also an extremely critical period for education. We cannot afford to create an economic underclass of Americans whose schooling has denied them a part in the labor force of the computer age.

The educational applications of the new technology go far beyond priming the workers of the future. Computers are already helping to strengthen the quality of teaching in a number of curriculum areas as well as extending the range of available educational opportunities. For example, students can interact with computers individually or in small groups and can create a situation where "hands on" experience becomes the dominant mode of instruction. Such activities, where students are active participants, engender the most effective types of learning and the experiences that remain with students for the longest time.

More specifically, computer interactions are helping to break barriers which have long prevented students from developing proficiency in such basic areas as mathematical problem-solving and writing. Student competence in mathematical problem-solving has long been an area of concern to educators. Computer usage has been shown to improve this vital basic skill. In order to program a computer to solve a problem, a student must have a thorough understanding of the nature of the problem and of the processes of his or her own thinking. Educators have observed that children enjoy programming, and the use of computers promotes both an improvement in problem-solving skills and a more positive attitude towards mathematics. Computers make the dynamic aspect of problem-solving an evident process. The immediate feedback and the clues that a computer provides become an interactive dialogue that encourages the student to take further risks and to explore alternatives, eventually culminating in solutions.

Another area in which the computer is enhancing education is word processing, which offers a means of easing many of the physical, and thus also attitudinal barriers to writing. Many students view writing as a cumbersome, if not intimidating physical project; however, using a computer makes revision painless. Students tend to both write longer compositions on computers and to revise them more. Additionally, the professional looking manuscript enhances student pride in the finished product.

Word processing need not be restricted to language arts and social studies. Numerous science-related activities can be done with the aid of a word processor. Students can write reports of all kinds or document experimental procedures. Collaborative projects involving groups of student authors can develop valuable social skills as well as encourage further reflection on the outcome of a research project or an experiment.

Problem-solving and word processing are also brought within the reach of a disabled student through the use of a computer. Computers can be programmed to perform complex tasks by responding to a single keystroke or a speech-controlled interface. A small number of computer commands can trigger complex motions of a robot arm, type output on a printer, or initiate a phone call. For students with special needs, the computer opens up channels of self expression and communication which are not available through any other medium. Any task that a disabled individual can perform with a computer will both decrease the ramifications of his disability and enhance his independence.

The computer is a vehicle for opening up communications networks and ideas available through software and data base services. Additionally, it enhances already existing access to educational and employment opportunities. Time spent at computers can improve motor coordination, provide recreation and be a means of expressing intellectual achievement.

It is reasonable to assume that given both adequate computer equipment and teacher training, most public schools should be able to provide all of the experiences described here. Yet, this same equipment, combined with a little imagination and a judicious selection of software and peripherals, can make school time even more interesting and effective. It can also change both the nature and quality of the curriculum. Following are some of these alternatives.

Many businesses use a spreadsheet program for budgeting, for inventory, or for data collection to help make marketing decisions. With spreadsheet programs, students can take surveys and follow them with simple or sophisticated statistical analyses. They can also prepare budgets or keep inventories. Some biologists now use this type of program to model population growth. All of these applications would greatly enhance any school curriculum.

The computer is used as a tool in the laboratory for many scientific experiments and tasks. Software and hardware already exist that allow students to monitor or collect data on temperature, humidity, precipitation, or blood pressure.

Many individuals as well as companies use a large data base for news reports or for research purposes. Tying into a data base such as *The Source* can inspire numerous educational activities.

Simulations are often used for specialized on-the-job training. Simulations train pilots, develop diagnostic skills in medicine, and are used by scientists to investigate theories and complex situations such as ecosystems. In the classroom the function of simulations can be very similar to their real world uses. They will allow students to investigate topics that were previously inaccessible to them because of the danger, the expense, or the magnitude of the task.

Speech synthesizers are still in their infancy. Interacting with a rather primitive form of advanced technology will help students put the computer revolution in perspective, see some limitations, and investigate some of the problems involved in the development of new technology.

The ramifications of introducing computers offer limitless potential to schools. By providing individualized and active environments for learning, computers are helping teachers develop basic skills in mathematical problem-solving and writing. Individuals with special needs are finding this technology to be a powerful tool which can bring their educational experiences more into the mainstream. Computers can be programmed to perform tasks which are otherwise difficult for disabled individuals and can thereby enhance their independence. They can also provide disabled persons with access to software, data base services, and opportunities for recreation. The introduction of speadsheet programs, simulations and speech synthesizers provides a means of improving instruction in many curriculum areas.

Any tool that can provide greater intellectual challenges and decisionmaking abilities should be a welcome and sought-after addition to our educational system. Development in the computer field occurs at an explosive rate, and the creative power of human minds continues to offer broader applications for science, communications, industry, and the arts. At the same time, our power to expend the potential of children will continue to grow.

In view of these many contributions which computers can make in the classroom, I urge the Subcommittee on Select Revenue Measures of the Committee on Ways and Means to support the further development of computers as instructional aids and the installation of computers and computer training in our schools. I believe that science centers, like the Lawrence Hall of Science in Berkeley, are prepared to provide necessary teacher training and help to develop new curricula to support the use of computers. As recommended in the report of the National Commission on Excellence in Education, the federal government should provide leadership and financial suport in these areas. I believe we should encourage the active participation of private industry through such measures as the Computer Contribution Act of 1983 (HR 701).

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Chairman STARK. Thank you very much, Ms. Burch.

I want to thank all of you again, especially who took vacation time or time, quality time, which you could be spending in many other ways. I appreciate it.

I will appreciate your support and help next year as we try to see this program expanded in California and to the rest of the country. I have some other testimony and it will appear in the record in its entirety. If any of you are interested when we finish these hearings, if you will let us know, we will see that you get a copy of the transcript.

Again, I want to thank the staff and the reporter and Mayor Feinstein for providing the hall.

The hearing is concluded.

[Whereupon, at 12:50 p.m., the hearing was adjourned.]

[Submissions for the record follow:]

STATEMENT OF DONALD DEVINE, PRESIDENT, TRILOG, INC., PHILADELPHIA, PA., ON BEHALF OF THE ASSOCIATION OF DATA PROCESSING SERVICE ORGANIZATIONS

Mr. Chairman, I am pleased to present this statement on behalf of the Association of Data Processing Service Organizations, Inc. (ADAPSO), the trade association of this nation's computer services industry. ADAPSO's members provide a broad range of computer services to the public including batch processing, facilities management, remote computing (timesharing), software products, software design, consulting, support services, and integrated hardware/software systems.

Virtually the entire ADAPSO membership of almost 700 private sector firms has a stake in educating future generations in the operations of computers. Our nation is caught up in an "information revolution", and computer technology is changing the way we live, work, and play. Our work force is changing course as a result of the "information revolution". High technology jobs are gradually replacing many traditional manufacturing positions. Unfortunately, our nation has not yet gained widespread computer literacy. We are not adequately training our young people to meet the responsibilities and needs of a more service oriented economy.

One reason for the failure to make young people more "computer literate" is the lack of computer equipment in many schools. Some industry experts suspect that we are dividing our society into the "haves'" and "have nots". Schools with computers can teach their students the necessary skills to succeed. Schools without computers, however, cannot train their students for high technology jobs. Therefore, we may actually be educating a subclass of students who will be permanently unemployable.

The obvious solution is to place a wide variety of state of the art computer equipment plus the necessary software and services to make this equipment productive in as many elementary and secondary schools as possible. Schools can well be expected to have differing requirements with respect to computer hardware. Along with the computer equipment, schools need extensive software libraries, maintenance and update agreements, training instructors, and local technical guidance. In other words, they should have complete systems tailored to the needs of the schools and their students. Unfortunately, many school districts find it difficult if not impossible to finance this kind of endeavor with their limited budgets.

Current legislative proposals, such as H.R. 701, the "Computer Contribution Act of 1983", encouraging hardware companies to donate equipment are inadequate to meet the goal of placing a wide variety of computer hardware, software and services in elementary and secondary schools. H.R. 701, for example, would amend the tax code and give a "double deduction" to manufacturers who donate qualified computer equipment. This is at an estimated cost to taxpayers of $60 million. The primary problem is that H.R. 701 encourages only donations of hardware, leaving the schools to pay for software, maintenance and support, and instructor training.

The objective of increased computer literacy would be better achieved if schools could be given complete computer systems. Complete usable computer systems include software, services and instructional capabilities available from numerous specialists in the industry not necessarily attached to computer equipment companies. Several amendments to H.R. 701 would ensure that schools can receive complete systems through private contributions.

First, the bill could be amended to allow reasonable deductions for contributions of software and support services. Teacher training, another important part of a complete school computer system might also be given deduction consideration. Unfortunately, the Internal Revenue Service has, at least informally, taken the position that these goods and services are "intangibles"; and section 170 of the Internal Revenue Code does not, at this point, provide for the deduction of charitable contribution of intangibles. Although it is sometimes difficult to set with any degree of certainty the exact cost of an intangible, an amendment for donation of intangibles can and should be structured specially, notwithstanding the existing language of section 170, perhaps by setting a percentage of the fair market value of the good or service as the amount of the deduction.

Second, hardware coverage could be broadened so as to encourage a variety of manufacturers of computer systems to contribute to schools. There is no compelling reason for restricting contributions to data processors with random access memory of no less than 32,000 bytes. Some students may derive more benefit from a smaller computer. Presently, only one or two companies may actually benefit from these proposals. Many large manufacturers may find it impossible to take advantage of the tax break. Smaller hardware manufacturers may not meet the requirements (size, time, etc.), or may not derive adequate benefit from participating. One result is that one company may gain an unfair competitive advantage by placing its equipment in an overwhelming number of schools and having a large number of students being trained on its equipment and software during the public education process.

Third, another amendment might expand the time period during which eligible contributions can be made. Relatively few companies have the excess manufacturing capacity to contribute to the schools and still fill their regular orders. If they are restricted to a one-year contribution period, it is unlikely that they will contribute computers and risk losing their customers. Understandably, a computer contribution program should not become an outlet for dumping excess inventory; however, the computer literacy problem is not such that computer contributions must be made during one year only regardless of what is available in the way of computer equipment, good, bad, or otherwise. If the time period is expanded, companies could work to fill their existing orders and still have time to make valuable contributions to schools.

A fourth amendment should include wholesalers, retailers, and other computer businesses among eligible donors. If the goal is to place computer systems in schools and not simply to favor one group, then a larger spectrum of businesses should be allowed to make contributions. Manufacturers may not necessarily be located as close to the recipient schools as a wholesaler or even a retailer. The schools may be able to get quicker and more responsive treatment with ready access to service.

A fifth and final amendment would strengthen the restrictions on use of donated equipment, software and services. To some it may appear a minor point, but to those of us in the computer services industry, unfair competition from the nonprofit sector, including local school districts, poses a real threat. Local school districts could be required to outline their scheme for use of the equipment, software and services, and they should be specifically prohibited from using the donations to compete in any manner with the private sector.

In addition to H.R. 701, other legislation could easily be drafted to allow computer equipment, software, training, services, and so on as an eligible cost under an existing educational grant program or one of the current proposals to improve the quality of math and science education in the schools. Computer systems could be added as an eligible cost with no increase in the authorized appropriation. The schools can use this grant money to purchase computer systems, and money is put back into the economy as taxable income to retailers, manufacturers, and services companies. ADAPSO believes that a grant program may even offer an advantage over tax deductions in that a school would be able to select the system or systems suited to their needs, rather than having to rely on donors to decide for them.

ADAPSO is firmly committed to the goal of computer literacy. That goal can only be met, however, if students are exposed to a wide variety of state of the art computer equipment plus the necessary software and services to make the exposure beneficial. With the aforementioned amendments and alternatives a complete and fair effort can begin very soon.

Statement of Tandy Corp./Radio Shack

Tandy Corporation appreciates this opportunity to submit a statement for the record in connection with the field hearing on H.R. 701, "The Computer Contribution Act of 1983." Tandy supports the goal of encouraging computer literacy among our nation's elementary and secondary school students. However, H.R. 701, as presently written, does not accomplish this objective, while at the same time it is far too costly to the American taxpayer.

Tandy Corporation/Radio Shack is the world's largest integrated manufacturer and retailer of electronic products for the home, office and schools, with over 8,750 stores and dealers worldwide. Tandy now owns the largest chain of computer stores in the world, which feature its own innovative line of TRS-80 compters, peripherals and accessories. The Company has nearly 500 Computer Centers and 584 company-owned stores with expanded computer departments in the United States, providing the computer customer with specialized assistance. Radio Shack's TRS-80 microcomputers and educational software are widely used by the educational community.

Radio Shack has been a pioneer in promoting computer education and computer usage in our schools. Not only has Tandy provided gifts, loans and discount purchases of more than 200,000 computers to schools, it has been at the forefront of promoting teacher training in the use and application of computers in the educational environment. Let me review briefly what our experience has been.

Beginning in 1979, Radio Shack instituted free classes in computer education for elementary and secondary school teachers. As of September 30, 1983, they had completed over 250,000 courses valued at $16,500,000, and over the past twelve months alone more than 150,000 teachers have been trained. The early success of this program led Radio Shack in March of 1983 to introduce America's Educational Challenge™—a program that provides every teacher in every elementary and secondary school in the United States with an opportunity to achieve a basic understanding of computers and their applications in education at no cost to themselves, their schools or taxpayers. Radio Shack mailed an America's Educational Challenge™ package, containing valuable classroom and teacher training material plus an order form to obtain the complete program, to principals and headmasters of 103,455 schools in the United States. a second package of materials could be ordered by the schools and we have already sent out over 36,000 of these packages of additional materials.

In addition to free educational materials, the program offers the opportunity for all elementary and secondary school teachers in the United States to attend 24 hours of free computer educational courses in the BASIC programming language and in microcomputer application in the classroom, which would normally cost over $200.

In April of 1982, Radio Shack instituted an Educational Grants Program to encourage and support the successful application of microcomputer technology in U.S. educational institutions. The program awards TRS-80 computer hardware, software, courseware and related products to individuals or non-profit educational institutions whose proposals are judged to provide the greatest benefit to the American educational community. Awardees are selected by an impartial Educational Grants Review Board, composed of distinguished educators. As of September, 1983, Radio Shack had made 43 awards with a total retail value of $629,715.00. Grant proposals to date have addressed these themes:

Computer literacy among teachers; basic skills in elementary education; the use of microcomputers for the handicapped and disadvantaged; and unique and innovative applications of microcomputers in education.

Radio Shack has worked closely with educators through a number of other programs designed to promote the use of computers in elementary and secondary schools. Radio Shack has created a multi-media instructional kit which provides secondary school students with information to help them begin considering computer-related careers. Radio Shack has also entered into general cooperative working relationships with sixty leading publishers who are including the TRS-80 microcomputer product line in their development plans for the education market.

The educational programs described above have allowed Radio Shack to work closely with teachers in our elementary and secondary schools to help them in planning and preparing teaching programs for the effective use of computers. We know from experience that merely placing computer hardware in the schools will do little to integrate them into the learning experience.

If Congress proceeds with legislation to encourage the contribution of computers to schools by providing an increased tax deduction, our experience demonstrates that three conditions must be satisfied in order to promote the education of children in the use of computers. First, a complete working computer must be donated. It does little good to encourage the contribution of unusable equipment. Second, software suitable for use in the educational environment must be a part of the contribution. Contributions of a computer alone—unaccompanied by at least some suitable software—do little to achieve the objective of educating students. Third—and most important—there must be adequate teacher training. To permit increased deductions without requiring adequate teacher training amounts to little more than a subsidy to computer manufacturers; it certainly does little to promote the education of children in the use of computers. The fact is that in some school districts where adequate planning and teacher training has not been done, there are computers in our classrooms gathering dust. Tandy knows from experience that the education of teachers in the use of computers is the critical link in achieving the goal of computer literacy for our young people.

Last year the House enacted the Apple Bill (H.R. 5573), which has been reintroduced in this Congress as H.R. 701. While H.R. 701 provides a solid foundation for proposed legislation in this area, it only addresses the equipment contribution part of the problem. Both the Apple Bill and H.R. 701 encourage computer manufacturers to donate computers to elementary and secondary schools by providing for a tax deduction of 200 percent of the cost of the computer. Tandy believes H.R. 701 can be improved in four significant areas, which has raised the concerns of many in the educational community.

First, the bill does not require the contribution of a complete, working computer.

Second, the bill does not require training of the teachers who would be using the computers as teaching tools. A number of education groups have criticized this deficiency.

Third, the bill does not require the contribution of software suitable for use in the educational environment; the deduction can be obtained by a contribution of hardware alone, and incomplete hardware at that.

Fourth, the tax deduction of 200 percent is very expensive and in our view is far in excess of what might be needed to stimulate additional contributions of equipment. The Washington Post estimated that last year's Senate version of the bill would have cost over $300 million. But whatever the precise cost, there is no doubt that a 200 percent tax deduction will amount to little more than a massive subsidy of one of America's most profitable industries at a time when the nation faces huge budget deficits.

House Majority Leader Jim Wright has introduced a bill (H.R. 2417) that substantially advances the goals envisioned by the authors of H.R. 701 but avoids some of the criticism that has been leveled at the bill and the Apple Bill. The Wright Bill permits companies which donate computers to elementary and secondary schools to take a deduciton of 125 percent of cost (rather than 200 percent), but only if suitable educational software and adequate teacher training are also provided at no additional cost to the taxpayer. It provides an appropriate incentive to computer manufacturers to participate without generating an unnecessary drain on the treasury. And, more important, it will provide greater benefits to our nation's schoolchildren who are the intended beneficiaries of these proposals. The Wright Bill represents an approach that Tandy strongly supports if Congress decides to enact legislation to provide an increased tax deduction to encourage the contribution of computers to schools.

Tandy appreciates the opportunity to submit a statement for the record in connection with the subcommittee's consideration of H.R. 701. Tandy is ready to expand upon its position in a further statement if the subcommittee so desires.

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